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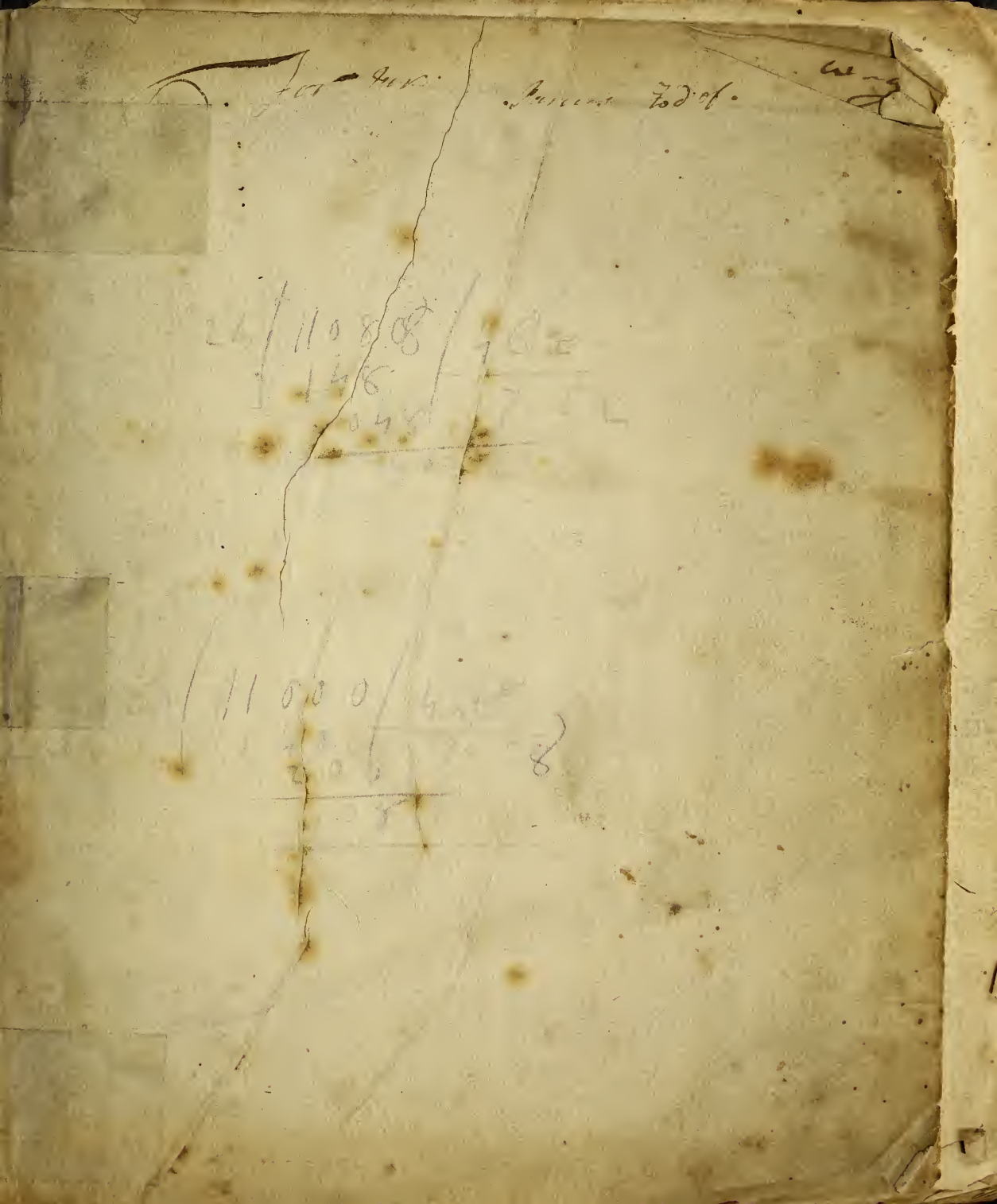
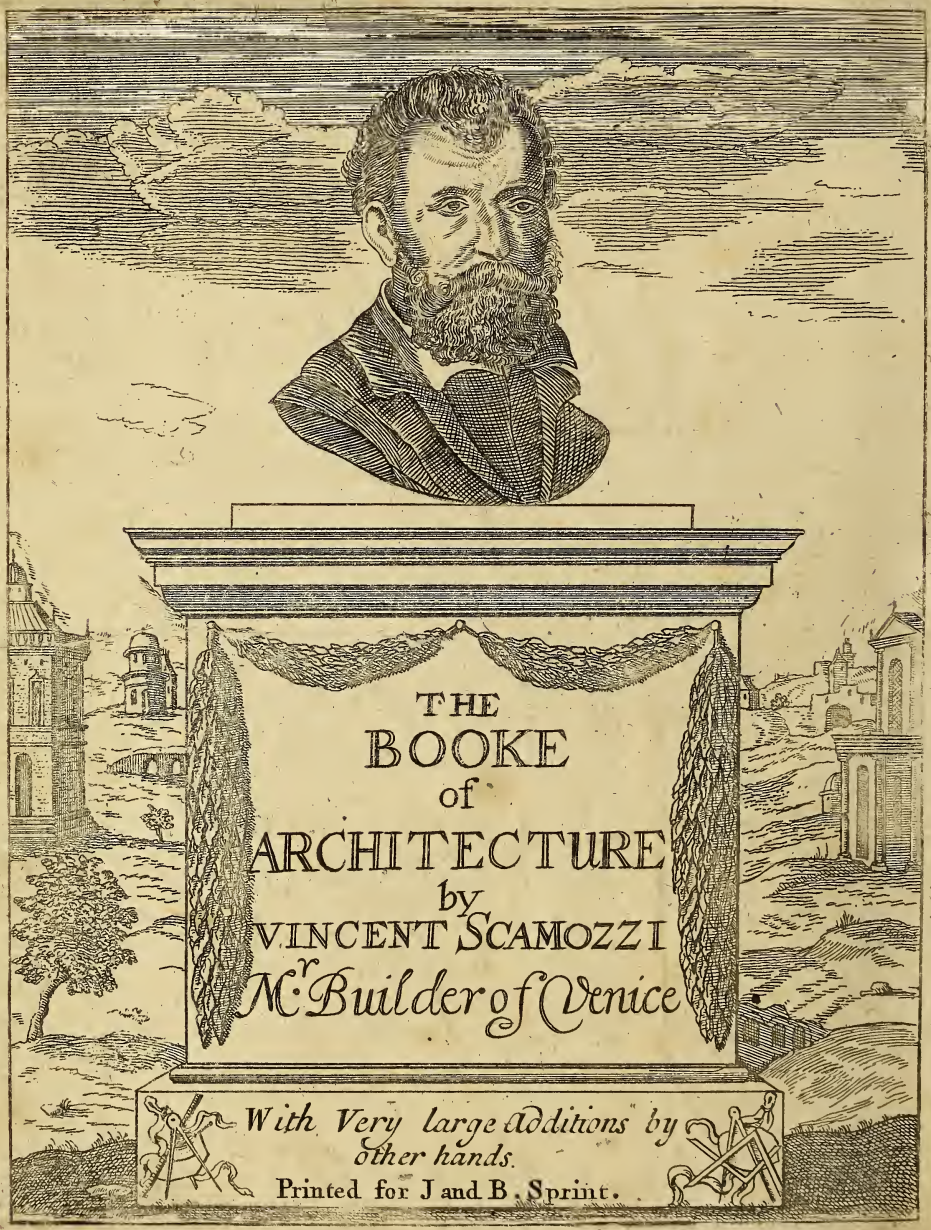




THE BOOKE of ARCHITECTURE

by

VINCENT SCAMOZZI

Mr Builder of Venice

With Very large Additions by other hands.

Printed for J and B. Sprint.

THE

Mirror of Architecture:

OR THE

GROUND-RULES

Of the Art of Building.

Exactly laid down by

VINCENT SCAMOZZI,

Master-Builder of

VENICE.

Whereby the principal Points of *Architecture* are easily and plainly demonstrated for the Benefit of all Lovers and Ingenious practitioners in the said Art.

With the Description and use of a *Joint-Rule*, fitted with Lines for the ready finding the *Lengths* and *Angles* of *Rafters*, and *Hips*, and *Collar-Beams*, in any Square or Bevelling *Roof* at any pitch; and the ready drawing the *Architrave*, *Frize*, and *Cornice* in any Order. With other useful Conclusions by the said Rule. By *John Brown*.

The Sixth Edition.

Whereunto is Added, *A Compendium of the Art of Building*. Giving a Brief Account of the Names, Natures, and Rates of all the Materials, belonging to the Erection, of an Edifice: And what Quantity of each sort will be needful for the Building of any House. Whereby Estimates, Valuations and Contracts may be made between Builder and Workman, without Damage to either. And how to measure the Works of the several Artificers belonging to Building; and what Method and Customs are observ'd therein.

By *WILLIAM LEYBURN*.

LONDON: Printed for *J.* and *B. Sprint*, at the *Bell* in *Little-Brittain*. 1721.

TO THE

LOVERS

OF

ARCHITECTURE.

Reader,

AS *in all things Order is to be obſerv'd, that we may avoid Confuſion, or elſe they will be a* Choas, *as the Poets fancy: So eſpecially in this excellent Art of* Architecture, *it is requiſite that every Part and Member have its right Order and due Proportion: And there having been many Maſters who have with great Care and Induſtry brought this Art to a great Perfection, among whom the Famous Maſter* Vincent Scamozzi, *Chief Builder of the Magnificient City of* Venice, *deſerves to be plac'd in the Firſt and Chiefeſt Rank by the conſent of all Judicious Artiſts. Therefore for the benefit of our own Nation, and that it may be made moſt uſeful for all Artificers in Building, and Lovers and Practitioners in this moſt uſeful Art, and for the greater Splendor and Glory of Princes Courts, Gentlemens Seats, and whole Cities, eſpecially the moſt Famous City of* London, *you have the larger Book reduc'd into a ſmaller Volume, and the*

Author

Author his given Parts, divided into Minutes; whereby the Principal Rules of Architecture *are made plain to ordinary Capacities by* Joachim Schuym, *an Ingenious Artist. And for your better Understanding take Notice, That by Model is signify'd the Measure of the whole Diameter of the Column; as for Example, let the Diameter be* 18, 16, *or* 12 *Inches, which shall be the Model divided into* 60 *Equal Parts or Minutes (as you may see in the Diagonal Scale ensuing) by using which Measure all the Parts of the said Column shall be Proportionable; and this dividing of the Column into* 60 *Equal Parts or Minutes shall be us'd to all the Columns. Also here is added the Description and Use of an Ordinary Joynt-Rule, fitted with Lines for the ready finding the Lengths, and Angles of Rafters and Hips, and Collar-Beams in any Square of Bevelling-Roofs at any pitch, and the ready drawing the Architrave, Frize and Cornice in any Order, with other useful Conclusions by the said Rule. With the Ground-Rules of the Art of Building, by that Ingenious Gentleman Sir* Henry Wooton, *in his* Elements of Architecture.

Also in this Sixth Edition is added, to make the whole the more Compleat, A Compendium of the Art of Building; *containing many useful Things both for Builders and Workmen, too large to be inserted here; therefore I refer you to the Treatise it self, and remain a Lover of the* Art of Building, *and your hearty Well-wisher.*

R. M.

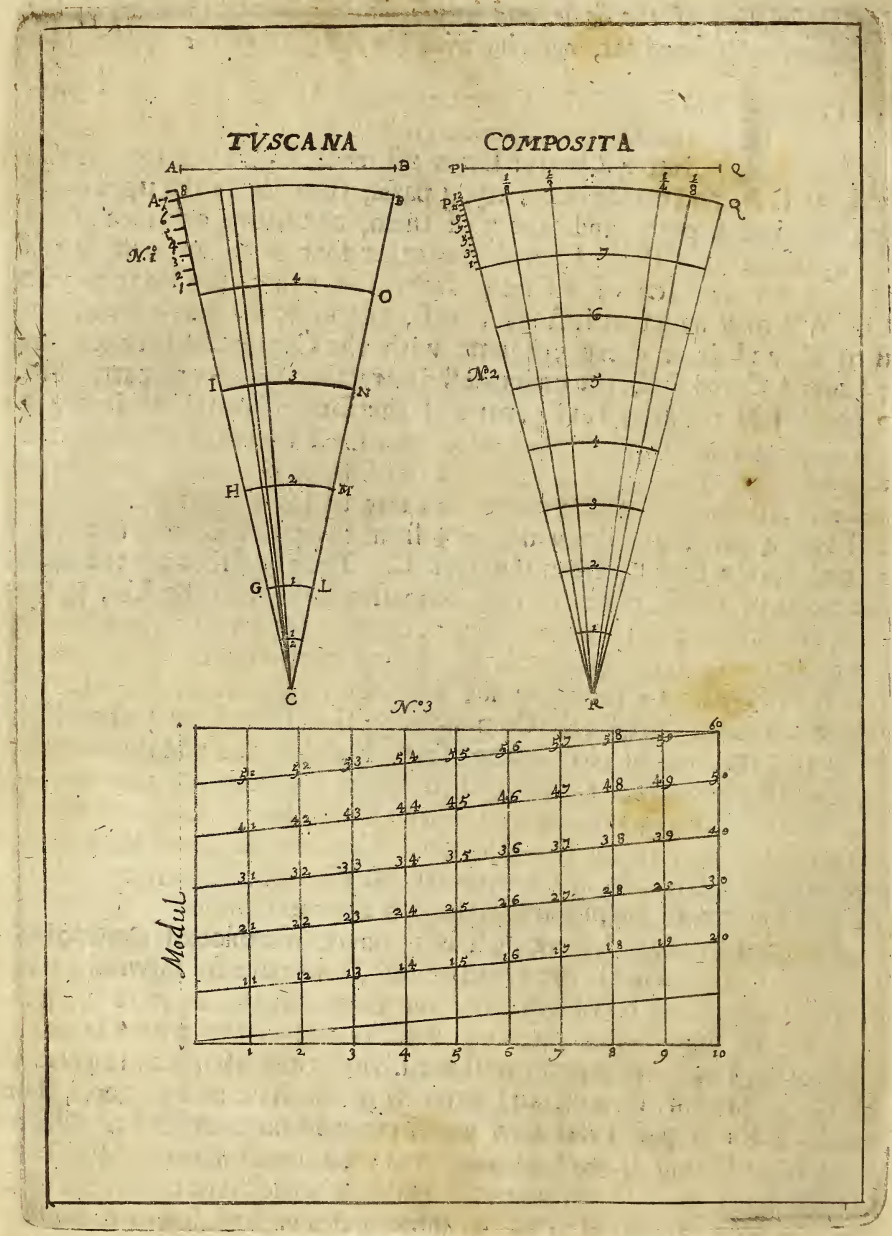
The Description of the Scale, and its use in dividing of the Parts in the Column easily found out, agreeing with the Measure of the Author.

No. I. THE highth of the uppermost Line A B is taken from the *Tuscan* Cornice (in the 6th Plate) and is divided into 4 $\frac{7}{8}$ parts: Draw a Line straight up so long as you will, as C A, and divide into 5 equal parts, then divide the uppermost 5th part into 8 parts, and take 7 of them, and fitting one foot of the Compasses in the Point C, and the other foot to the uppermost 7th part, draw an Arch of a Circle, from that 7th part so far as the Line A B may be set on it from A to B, and draw a Line sloping from B to C, and draw every 5th part with the Compasses between the 2 Lines A C and B C, the undermost drawn Line G L is one part, H M 2 parts, I N 3 parts, K O 4 parts of the Line A B divided into 4 $\frac{7}{8}$ parts: Then to divide the parts so, you must see what use you have thereof in your Cornice, and divide the Line A B into so many parts as there is occasion, as in 3 parts; so draw a Line $\frac{1}{3}$ from the point C, and into 4 parts, and draw a Line $\frac{1}{4}$ from the point C, and then into 5, and draw a Line $\frac{1}{5}$, from the point C. Then to strike out the small Members of the Cornice, set the Compasses from H to the Line $\frac{1}{5}$, the which will give $\frac{2}{5}$ parts of the Line A B, then follows $\frac{2}{6}$; therefore set your Compasses on F and the Line $\frac{1}{3}$, then have you the $\frac{2}{6}$ part, next follows the part 1; therefore set your Compasses from G to L, the which is 1 part; then set the Compasses on G and the Line $\frac{1}{5}$, the which is then $\frac{1}{5}$ part, then set your Compasses on F and $\frac{1}{4}$, and add that to G L, and it makes together 1 $\frac{1}{8}$ part, then follow two parts $\frac{1}{5}$, then set the Compasses from I to the Line $\frac{1}{4}$, the which is $\frac{3}{4}$ parts, then on F and $\frac{2}{3}$ which is $\frac{1}{6}$ part, then on H and $\frac{1}{3}$, which is $\frac{2}{3}$, and on G and the Line $\frac{1}{4}$, which is $\frac{1}{4}$, and do the like with every Member of the Cornice and the Base, as you may see plainly in the 6th Figure.

No. II. The slope Line P Q R is upon the Cornice of Compositа, which is to be divided into 7 and $\frac{1}{2}$ $\frac{1}{2}$ parts, and one half twelfth part 7 $\frac{1}{2}$ $\frac{2}{2}$: $\frac{1}{2}$, and may be drawn after the same manner, as with the Dorick, Ionick, and Corinthian, as you see plainly in the 24th Figure.

No. III. The Author gives well the dividing the Members in general of the Ornament, Impost, and Arch, with the Base and Cimacia, but not so plain in particular how much every Member must be. There have been several Lovers of the Art, who have endeavour'd to find out the dividing of the Minutes. So I thought necessary to put the Minutes to it, and of the same to make a Scale. And for to make the Scale right, divide your Model into 6 parts on one side, and divide the other side into 10 parts, and so draw your Lines diagonal ways, after the manner of the Draught of the Diagonal Scale in the next Leaf ensuing. So is your Scale made, by which all the Members are easily and rightly divided.

To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The Mirror of Architecture.

The Description of the Five Orders of ARCHITECTURE, *and first beginning with the* Tuscan-*Column.*

Plate I.

HERE is shown how the Colums follow one another, and how high every one must be.

The *Tuscan* must be eleven Models and one fourth high; whereof the Pedestal must be one Model seven eighths, or one Model and fifty two Minutes and a half: The Column must be seven Models and a half; the Ornament must be one Model and seven eighths: and so the Ornament is one fourth of the heighth of the Column, and the Pedestal also is one fourth of the heighth of the Column.

The *Dorick* must be twelve Models and fifty three minutes and a half high; whereof the Pedestal must have two Models and sixteen minutes: The Column must be eight Models and a half; the Ornament must be two Models and one eighth: So the Ornament is one fourth of the height of the Column, and the Pedestal is three and three fourths of the height of the Column.

The *Ionick* must be thirteen Models high; whereof the Pedestal must have two Models and a half; the Column must have eight Models and three fourths; and so the Ornament comes to be one fifth part of the heighth of the Column, and the Pedestal three and a half of the heighth of the Column.

The *Roman* or the *Compositа* must be fourteen Models and seven tenths high, or fourteen Models forty two Minutes; whereof the Pedestal must be three Models; the Column nine Models and three fourths; and the Ornament must have one Model and nineteen twentieths, or one Model and fifty seven Minutes: So the Ornament comes to be one fifth part of the heighth of the Column, and the Pedestal three and one fourth of the heighth of the Column.

The *Corinthian* must be fifteen Models and one third high; whereof the Pedestal must be three Models and one third, the Column must be

ten Models; the Ornament muſt have two Models: And ſo the Ornament comes to be the fifth part of the heighth of the Column, and the Pedeſtal one third of the heighth of the Column.

Plate II.

If you would make Galleries without the Pedeſtal, you muſt take the heighth of nine Models and three eighths to make the Work the more ſtately; ſo you may make one groſs Baſe under of half-Model: The breadth muſt be eleven Models and two thirds; the middle inter-Column muſt be three Models; the inter-Column of either ſide muſt be two Models and one third. But if you will make them of ſix Columns, they muſt be eighteen Models and one third; and of eight Columns, they muſt be twenty five Models: The heighth for the lights of the Gate muſt be four ſeventhes of the heighth of the Column, with his Architrave and Frize, and comes to four Models and fifty nine Minutes; and the breadth is two ſeventhes; the heighth is two Models and twenty nine Minutes and a half: The Ornament muſt be one fourth of the heighth of the lights, the Door is one Model and one fourth.

Plate III.

The *Tuſcan* Arch muſt be three Models and fifty two Minutes wide; the Pilaſters under to the Foot of the Column muſt be thirty four Minutes; the heighth to the top of the Impoſt is five Models and ſixteen Minutes; the Impoſt is twenty ſeven Minutes high, divided into eight parts and one fourth; the ſmall Arch, or Bow, is twenty ſix Minutes divided into eight parts: The Arch muſt make an half Circle, and ſomewhat more than one eighth of the Model, and for the projecture of the Impoſt to diminiſh the ſight. Upon the right and left ſide, you muſt make Windows; of the middle Gate the Key-piece is forty Minutes high.

Plate IV.

If you will make the *Tuſcan* Gallery with the Pedeſtal, the whole heighth muſt be eleven Models and one fourth, and the breadth thirteen Models and two thirds of both the outermoſt Columns diſtance, whereof the middle inter-Column muſt be three Models forty Minutes; the inter-Columns on the right and the left ſide muſt be three Models: But if you make the Gallery of ſix Columns they muſt be twenty one Models and two thirds; and if they be of eight Columns, they muſt be twenty nine Models and two thirds: The heighth for the light of the Gate muſt be four ſeventh parts of the under-edge of the Pedeſtal, to the upper edge of the Frize, and ſix Models and three Minutes and two thirds; and the breadth is two ſeventh parts, and is three Models

and

and one Minute and five ſixths: The Ornament muſt be one fourth of the heighth of the lights of the Door, and is one Model and thirty one Minutes, whereof the Architrave muſt have thirty Minutes and one third; the Frize twenty four Minutes and one fourth; the Corniſh thirty ſix Minutes and a half.

Plate V.

The *Tuſcan* Arch is in diſtance from one Pedeſtal to the other four Models and twenty Minutes; the Pedeſtal on the Foot of the Column is forty Minutes; the heighth from under the Pedeſtal, to the upper-edge of the Impoſt, is ſix Models and twelve Minutes and a half; the heighth of the Impoſt is forty one Minutes and five ſixths; the Arch or Bow is twenty nine Minutes; the Key-piece in the Arch is fifty Minutes high; the Arch is higher half a Circle and ten Minutes for the projecture of the Impoſt: There the Arch begins, divided into five parts; four of the ſame are for the lights of the Door of the principal Gate, and are five Models and five Minutes; the breadth of the lights is two Models and thirty two Minutes and a half; the Ornament is one Model and ſixteen Minutes and a half high, whereof the Architrave muſt have twenty five Minutes and one third; the Frize twenty Minutes and five twelfths, the Corniſh thirty Minutes ſeven twelfths: Or divide the Ornament one Model ſixteen minutes in fifteen parts, and give five to the Architrave, four the Frize, ſix the Corniſh.

Plate VI.

Shews the particular members of the *Tuſcan* Column: On the right-ſide have we the Pedeſtal and the Baſe: The Pedeſtal is one fourth of the heighth of the Column, and comes to one Model ſeven eighths, which muſt be divided into five parts; whereof give the under-Cimacium and the Plinth one and one third of Troco, or make two and two thirds the upper Cimacium one part, the upper Cimacium is 22 Minutes and a half: Divided in parts, 5 parts and 7 and twenty fourths, the Baſe is half a Model, and is to be divided into 5 parts. Under the body of the Column is one ſmall liſt of one half part, making three Minutes: Of the left-ſide is the Ornament and the Capital; the Capital is half a Model high, and is to be divided in ten parts; the like part hath alſo the Aſtragal; the Ornament is one fourth high; the Column gives one Model and ſeven eighths, this divided in ſeventeen parts and one third, whereof give the Architrave five parts, the Frize ſix parts and one third; the Corniſh ſix parts; the Architrave five parts, is thirty two Minutes and a half, divided in eight parts and ſeven eighths; the Frize is forty one Minutes, with his uppermoſt liſt, which is plac'd

right over the middle of the Column, ſo high as the Friſe is, and the breadth thirty Minutes: After this breadth the Friſe jets out ſeven Minutes and a half. Here is alſo after the Friſe the Liſt of the Minutes and a half; the Ornament is thirty nine Minutes high, divided in four parts and ſeven eighths, ſo you may this Column and all its members, with the Impoſt; and alſo all the other four Columns muſt be divided after the ſame manner with minutes; whereof the Column muſt be divided into ſixty minutes, and made after this manner; The Scale is made in the firſt Figure, and the Rule wherewith you divide your parts ſhall be ſet P, and for minutes an M: It may be eaſily underſtood.

Plate VII.

Here followeth the great and ſmall Impoſt with his Arch and Ornament of the principal Gates; upon the right-ſide is the Impoſt and Arch; the Impoſt and Arch of the ſmall Arch ſtands beneath, mark'd with the Letter K; the Impoſt is twenty ſeven minutes high, divided in eight parts and one fourth; the like part hath Aſtragal of the Impoſt: The ſmall Arch or Bow is twenty ſix Minutes, divided in eight parts and ſeven eighths; the heighth of the great Impoſt is forty one Minutes and five ſixths, divided in ſix parts; the great Arch or Bow is twenty nine Minutes high, divided in eight parts and ſeven eighths. Of the left-ſide is the Ornament of the principal Gate, and is one Model ſixteen Minutes and a half high, whereof cometh twenty five minutes, and a half: The Architrave divided into 8 parts and one third; the Friſe is 20 Minutes and five twelfths high; the Corniſh is 30 Minutes and ſeven twelfths high, divided in four parts and ſeven twelfths.

Plate VIII.

If you will make the Dorick-Gallery without the Pedeſtal, then you muſt divide the whole heighth into ten Models and thirty ſeven Minutes and a half; and to make the Work appear the ſtatelier, you may make one groſs Baſe under of half a Model high, and of four Columns breadth muſt be nine Models forty five Minutes, whereof the middle inter-Column muſt be two Models and three fourths; in the inter-Colums of either ſide muſt be one Model and a half; of four Columns breadth in the Friſe muſt be eight Trigliffs, and ſeven Methops: But if you will make them of ſix Columns you muſt divide the breadth into fourteen Models and three fourths; and there muſt be in the Friſe of the ſix Columns twelve Trigliffs and eleven Methops: Alſo if you will make the Gallery of eight Columns, then muſt the breadth be 19 Models and three fourths; the heighth of the lights of the Door, is four ſeventhes of the heighth of the Column, with his Architrave and

Friſe,

Friſe, and comes to five Models and one third; and the breadth of the light of the Door and muſt be two Models forty Minutes; the Ornament muſt be one fourth of the heighth of the lights of the Door; and is one Model twenty Minutes divided in fifteen parts; give five to the Architrave, four to the Friſe, ſix the Corniſh; and ſo the Architrave is twenty ſix Minutes and two thirds, the Friſe twenty one Minutes and one third, the Corniſh thirty two Minutes.

Plate IX.

The Dorick-Arch muſt be ſix Models and fifteen minutes wide from the middle of one Column to the middle of the other; and muſt ſtand a little more than half out of the Pilaſter: The Pilaſter is thirty two minutes broad under on the Foot of the Column; the Impoſt is twenty ſeven minutes and a half high, divided in eight parts and five ſixths: The like part alſo hath the Aſtragal: Underneath the heighth of the Arch or Bow is twenty ſeven minutes and one fourth, divided into ſix parts and one third; the Key-piece in the Arch is high forty minutes; the Arch is higher than half a Circle ten minutes for the projecture of the Impoſt; the heighth to the top of the Impoſt from the Baſe, is ſix Models and four minutes and a half.

Plate X.

The Dorick-Gallery with the Pedeſtal, the whole heighth of the Column muſt be twelve Models and fifty three minutes and a half; and four Columns muſt be thirteen Models and a half broad, whereof the middle inter-Column muſt be four Models; the inter-Column of the ſide two Models and three fourths: Upon the four Columns muſt be 11 Trigliffs, and 10 Methops; but ſix Columns muſt be 21 Models broad, and ſeventeen Trigliffs, and ſixteen Methops; but eight Columns muſt be the breadth of twenty eight Models and a half, twenty three Trigliffs, and twenty two Methops: The light of the Door is four ſevenths of the under-edge of the Pedeſtal, to the uppermoſt edge of the Friſe, and is ſix Models fifty ſeven minutes and three fourths; the breadth is three Models twenty four minutes and three fourths; the Ornament is high one fourth of the heighth of the lights, and one fourth, which is one Model thirty eight minutes and one ſixth, whereof the Architrave muſt have thirty two minutes and three fourths; the Friſe twenty ſix minutes and one ſixth, the Corniſh thirty nine minutes aud one fourth.

Plate XI.

If you would make the Dorick-Gallery with the Pedeſtal, then muſt the diſtance from one Pilaſter to the other be 5 Models and one fourth; the

the heighth from the under-edge of the Pedeſtal to the upper-edge of the Impoſt, is ſeven Models ſix Minutes; the Impoſt is fifty Minutes high; the Arch or Bow thirty four Minutes; the Corner-piece is fifty Minutes; the Arch is higher than one half Circle and twelve Minutes and a half for the projecture of the Impoſt; the heighth of the lights for the Doors is five Models and fifty two Minutes; the breadth of the lights is two Models and fifty two Minutes: The Ornament is one Model twenty three Minutes and a half high, of which the Architrave hath twenty ſeven Minutes and five ſixths; the Frize is twenty two Minutes and one fourth, the Corniſh is thirty three Minutes and five twelfths: or divide the Ornament in fifteen parts, five the Architrave, four the Frize, ſix the Liſt.

Plate XII.

Here is ſhown the particular Members of the Dorick Column: On the right-ſide we have the Pedeſtal and the Baſe; the Pedeſtal is three and three fourths of the heighth of the Column, and comes to two Models and ſixteen Minutes, divided into ſix parts; whereof give the under-Cimacium two parts, the body of the Column makes three parts; the upper-Cimacium one part, the under-Cimacium is forty five Minutes: There hath the Plinth thirty Minutes; the other members in fifteen Minutes, divided in three parts and three fourths; the upper Cimacium is twenty two Minutes and a half, divided in five parts nineteen twenty fourths; the Baſe is one half Model, divided in five parts and two thirds; the Liſt upon the Baſe is one third, or two minutes, and ſtands off from the Column: On the left-ſide is the Ornament and Capital, the Capital is one half Model high, divided in eleven parts and ſeven twelfths; and the like part hath the Aſtragal: The Ornament is one fourth high of the heighth of the Column, as is two Models ſeven Minutes and a half divided in eighteen parts and one ſixth; thereof give the Architrave five parts, is thirty five minutes divided in ſeven parts and two thirds; the Frize ſix parts and one third, is forty five Minutes; the Liſt above the Frize one third is five Minutes; the Corniſh ſix parts, is forty two Minutes, divided in ſix parts and ſeven twenty fourths (the Author gives ſix parts and one fourth) that it may come forth more: In the Corniſh muſt come in ten Dentils, beſides the Grape that hangeth on each ſide.

Plate XIII.

Here is ſhewn the great and ſmall Impoſt with his Arch and Ornament of the principal Gate of the Dorick order: On the right-ſide is the Impoſt and Arch, the Impoſt and the Arch of the ſmaller Bow, ſtanding

ſtanding below, mark'd with the letter K: The Impoſt is twenty ſeven Minutes and a half high, divided in eight parts and five ſixths; a like part hath alſo the Aſtragal of the Impoſt; the ſmall Arch or Bow is twenty ſeven Minutes and one fourth, divided in ſix parts and one third; the heighth of the Impoſt Major, or greater Impoſt; is fifty Minutes, divided into nine parts and three eighths; the great Arch or Bow is thirty four Minutes high, divided in ſix parts and two thirds: On the left-ſide is the Ornament of the principal Gate, and is high one Model twenty three Minutes and a half; whereof the Architrave hath twenty ſeven Minutes and five ſixths, divided in ſix parts and two thirds; the Frize is twenty two Minutes one fourth; the Corniſh is thirty three Minutes and five twelfths, divided in four parts and three fourths. *Plate* XIV.

If you would make the Ionick Gallery without the Pedeſtal, then muſt you divide the whole heighth in ten Models and a half, to make the Work ſhew the more ſtately; and under it make one groſs Baſe of half a Model high, and of four Columns breadth muſt be ten Models and twenty one Minutes; whereof the middle inter-Column muſt have two Models and a half; the inter-Columns that ſtand on the right and left ſide muſt be one Model fifty five Minutes and a half; on the middle of each Column and the Pilaſter muſt be one Modillon; in the outermoſt inter-Column ſhall be five ſpaces, in the middlemoſt ſix ſpaces; the four Columns have from the middle of the firſt to the middle of the laſt Column ſixteen Spaces and Modillons: But if Men will make them of ſix Columns, then muſt they divide the breadth in ſixteen Models and one ſixth; and there comes on the ſix Columns between the Modillons twenty ſix ſpaces; and of eight Columns muſt the breadth be twenty two Models, and there come on the Columns thirty ſix ſpaces between the Modillons: The heighth of the lights of the Doors is four ſeventhes of the heighth of the Column, with his Architrave and Frize above the Modillons, and the light comes to 5 Models and five ſixth; the breadth of the lights of the Doors comes to 2 Models forty eight Minutes and a half; the Ornament muſt be one fourth and one half of the heighth of the lights of the Doors, and is one Model and eighteen minutes, divided in fifteen parts; give five to the Architrave, four the Frize, ſix the Corniſh; and the Architrave is twenty ſix minutes and three fourths, the Frize twenty minutes, the Corniſh thirty one minutes and one fourth. *Plate* XV.

The Minor or ſmaller Ionick Arch muſt be wide from one Pilaſter to the other three Models fifty Minutes, and muſt ſtand more than one half

out

out of the Pilaſter; the Pilaſter is thirty Minutes under on the breadth of the Column; the Impoſt is high twenty eight Minutes and a half, divided in nine parts and a half; ſuch like parts hath alſo the Aſtragal there under the heighth of the Arch or Bow twenty four Minutes and one fourth, divided in ſeven parts and one twenty fourth; the Key-piece in the Arch is fifty Minutes high; the Arch is higher than one half Circle twelve Minutes; the heighth from above the Impoſt to the under-edge of the Baſe, is ſix Models and eighteen Minutes.

Plate XVI.

The Ionick-Gallery with the Pedeſtal, the whole heighth of the Column muſt be thirteen Models, and the four Columns breadth muſt be twelve Models and two thirds, whereof the middle inter-Column muſt be three Models and two thirds, the inter-Column on the ſide muſt be two Models and a half; on the four Columns from the middle of the firſt to the middle of the laſt Column, cometh twenty Spaces and Modillons, of ſix Columns breadth, in nineteen Models and two thirds, and hath thirty two ſpaces between the Modillons; and of the eight Columns breadth is twenty ſix Models and two thirds, and hath forty four ſpaces between the Modillons: The light of the Door is four ſeventhes from the under-edge of the Pedeſtal of the Column, Architrave and Frize, to the upper edge of the Modillons, and is ſeven Models ſeventeen Minutes; the breadth of the Door of the lights is three Models thirty Minutes and three eighths; the Ornament muſt be one fourth and one half of the heighth to the lights of the Doors, and is one Model five eighths divided in fifteen parts; give five to the Architrave, four to the Frize, ſix to the Corniſh; the Architrave is thirty two Minutes and a half, the Frize twenty ſix Minutes, the Corniſh thirty nine Minutes. *Plate* XVII.

If you would make the Ionick Arch with the Pedeſtal, then muſt the diſtance from one Pilaſter to the other be four Models and fifty Minutes; the heighth from the under edge of the Pedeſtal, to the upper edge of the Impoſt, is 7 Models and 35 Minutes; the Impoſt is fifty Minutes and one fourth high; the Arch or Bow thirty Minutes and a half; the Corner-piece one Model; the Arch is higher than one half Circle 15 Minutes; the heighth of the lights of the Doors is 6 Models 16 Minutes and a half; the breadth of the lights is three Models and two Minutes; the Ornament is high one Model twenty five Minutes and a half thereof; the Architrave hath twenty eight Minutes and a half, the Frize hath twenty two Minutes and four fifths; the Corniſh thirty four Minutes and one fifth; the Pilaſter is thirty five Minutes broad under on the Column. *Plate*

Plate XVIII.

Here is ſhewn the particular Members of the Ionick Column: On the right-ſide you have the Pedeſtal and Baſe; the Pedeſtal is three and a half of the heighth of the Column, and comes to two Models and a half of the heighth, divided into ſix and two thirds, thereof give the under-Cimatium two parts, the Trunk or the Neck three parts and two thirds; the upper Cimatium is one part; the under Cimatium forty five minutes thereof; give the Plinth thirty minutes, the other fifteen minutes, divided in four parts and one fourth; the upper Cimatium is twenty two minutes and a half, divided in ſix parts and five eighths; The Baſe is half a Model, divided in five parts and ſeven twelfths; on the Column be two members divided out with the aforeſaid parts, is three minutes, and three fourths: On the left-ſide is the Capital and Ornament; the Capital is thirty one minutes and a half high of the under-edge of the Scroll, or more; the Aſtragal on the upper-edge of the Abacus is eighteen minutes and five ſixths, divided in ſeven parts and one fourtieth; the Ornament is one Model and three fourths high, and is one fifth of the heighth of the Column, divided in fifteen parts; give the Architrave five, the Frize four, the Corniſh ſix; the Architrave five parts and thirty five minutes, divided in eight parts and one fourth; the Frize is twenty eight minutes, and muſt have one Liſt on one fourth part, ſuch-like part as the Corniſh hath of one minute and a half; the Corniſh is forty two minutes, divided in ſeven parts and five twelfths, and one half twelfth part, or in ſeven parts and eleven twenty fourths; but if you are to make great or Royal Work, then commonly is the Frize carved: So muſt the ornament be between one fourth and one fifth part of the heighth of the Column, and divided in ſixteen parts and two thirds; give the Architrave five parts, the Frize five and two thirds, the Corniſh ſix parts.

Plate XIX.

Here is ſhewn the great and ſmall Impoſt, with his Arch and Ornament of the principal Gate of the Ionick Order. On the right-ſide is the Impoſt and Arch; the Impoſt and Arch of the ſmall Bow, ſtanding beneath the Impoſt, is twenty eight minutes and a half high, divided in nine parts and a half; ſuch-like parts hath alſo the Aſtragal; the Arch or Bow is twenty four minutes and one fourth, divided in ſeven parts and one twenty fourth; the great Impoſt is high fifty minutes and one fourth, divided in eight parts eleven twenty fourths; the great Arch or Bow is high thirty minutes and a half, divided in ſeven parts and a half: On the left-ſide is the Ornament of the principal Gate,

and is high one Model twenty five minutes and a half; the Architrave is high twenty eight minutes and a half, divided in ſeven parts; the Frize is high twenty two minutes and four fifths; the Corniſh is high thirty four minutes, divided in five parts and ſeventeen twenty fourths; under and above the Frize is one of one fourth part of the aforeſaid parts.

Plate XX.

If you would make the Roman Gallery without the Pedeſtal, then muſt you take the heighth of eleven Models and ſeven tenths, and make one groſs Baſe under of one half Model high; and of four Columns breadth muſt be nine Models forty minutes, whereof the middle inter-Column muſt have two Models and one fourth: The inter-Column ſtanding on the right and left-ſide, muſt be one Model forty two minutes and a half: On the middle of each Column muſt come one Modillon; and in the outward inter-Column muſt come five ſpaces; in the middle inter-Column ſix ſpaces: The four Columns have from the middle of the firſt to the middle of the laſt Column, ſixteen ſpaces and Modillons; but if you make them ſix Columns then muſt the breadth be fifteen Models and one twelfth; and there comes on the ſix Columns between the Modillons twenty ſix ſpaces; and of eight Columns the breadth muſt be twenty Models and a half, and there comes on the eight Columns thirty ſix ſpaces between the Modillons: The heighth of the Lights of the Doors is four ſeventhes of the heighth of the Column, with his Architrave and Frize: From the upper edge of the Modillons, and the lights, is of ſix Models thirty Minutes; and the breadth of the lights of the Doors, of three Models twenty five minutes; the Ornament muſt be three parts and one fourth of fifteen Parts of the heighth of the Lights, and is one Model twenty four minutes and a half, divided in fifteen parts; five for the Architrave, four the Frize, ſix the Corniſh; and the Architrave is twenty ſeven and a half, the Frize twenty two, the Corniſh thirty three without the Gola and Orle, the which next belongs to the Corniſh of the Frontiſpiece.

Plate XXI.

The ſmall Roman Arch muſt be from one Pilaſter to the other four Models and thirty four minutes, and muſt ſtand ſomewhat more than half out of the Pilaſter; the Pilaſter is twenty eight minutes; under on the breadth of the Column, the Impoſt is high thirty one minutes and one ninth, divided in eleven parts and one twelfth; ſuch like parts hath alſo the Aſtragal; there under the heighth of the Arch or Bow is twenty eight minutes, divided in ſeven parts and two thirds; the Key-piece in the Arch is high fifty minutes; the Arch is higher than one half-

half-Circle fourteen minutes; the heighth from above the Impoſt, from the under-edge off from the Baſe, is ſix Models fifty four minutes.

Plate XXII.

The Roman Gallery with the Pedeſtal, the Column muſt be fourteen Models and forty two minutes high; and the breadth of four Columns muſt be eleven Models and fifty minutes; whereof the middle inter-Column muſt be three Models and one third; the inter-Column on the ſide two Models fifteen minutes: On the fourth Column from the middle of the firſt to the middle of the laſt Column, cometh twenty ſpaces and Modillons; of ſix Columns breadth is eighteen Models twenty minutes, and hath thirty two ſpaces between the Modillons; and of eight Columns breadth is twenty four Models and fifty minutes, and hath forty four ſpaces between the Modillons: The lights of the Doors is high four ſeventhes from the under edge of the Pedeſtal with his Column; the Architrave and Frize to the upper-edge of the Modillons, comes to eight Models twelve minutes and four fifths: the breadth of the lights of the Doors is three Models fifty three minutes and a half; the Ornament muſt be three fourteenths and one fourth; for the Architrave, Frize and Corniſh of the heighth of the lights of the Doors, and comes to one Model and fifty three minutes, divided in five parts; give five to the Architrave, four the Frize, ſix the Corniſh; and the Architrave is thirty ſeven minutes and two thirds; the Frize thirty minutes and one ſixth; the Corniſh is forty five minutes and one ſixth.

Plate XXIII.

If you make the Roman Arch with the Pedeſtal, then muſt the diſtance from one Pilaſter to the other be five Models and a half; the heighth from the under-edge of the Pedeſtal, to the upper-edge of the Impoſt, is eight Models forty two minutes and a half; the Impoſt is high fifty five minutes and a half; the Arch or Bow is thirty three minutes; the Corner-piece one Model high; the Arch is higher than one half Circle ſeventeen minutes and a half; the lights of the Doors is ſeven Models eighteen minutes high; the breadth of the lights is three Models twenty ſix minutes and a half; the Ornament is high one Model twenty four minutes; thereof the Architrave hath thirty one minutes and one third; the Frize is twenty five minutes and one twelfth; the Corniſh is thirty ſeven minutes and ſeven twelfths, the Pilaſter under on the Column is thirty two minutes and a half broad; the Architrave thirty one minutes and one half broad; the Architrave thirty one minutes and one third, divided in 7 parts and two thirds; the Corniſh is thirty ſeven minutes and ſeven twelfths, divided in five parts twenty three twenty fourths; above the Frize is one Liſt of one fourth part that goes off from the Frize.

Plate XXIV.

Here is ſhewn the particular members of the Roman Column: On the right-ſide you have the Pedeſtal and Baſe; the Pedeſtal is three and one fourth of the Column's heighth, and comes to three models, which divided in eight parts, give thereof the under-Cimacium two parts, the neck five parts, the upper-Cimacium one part, the under-Cimacium forty five minutes; thereof give the Plinth thirty minutes; the other fifteen minutes, divided in four parts and one ſixth; the neck of the Pedeſtal is high one model and ſeven eighths, and the breadth is one model twenty four minutes; the upper-Cimacium is twenty two minutes and a half, divided in ſix parts and four fifths; the Baſe is one half-model, divided in ſix parts: On the Column be two members, and are to be divided out with the aforeſaid parts, three minutes and three fourths: On the left-ſide is the Capital and Ornament; the Capital is high one Model and one ſixth, or ſeventy minutes, which divided in 23 parts and 1 third, to make the ground of the Capital, take one Square of 1 model and a half, each ſide of the Square draw one round Circle of ſix ſeventhes of a model, or fifty one minutes, (or ſo thick as the Column is above,) and all the other jeetings over the like, as be made in *Corinthi*; but the Scrolls are made after the Ionick manner: The Ornament is one model fifty ſeven minutes, and is one fifth of the heighth of the Column, divided in fifteen parts; thereof give the Architrave five parts, the Frize four parts, the Corniſh ſix parts; the Architrave five parts is thirty nine minutes, divided into nine parts; the Frize 31 minutes and one fourth; the Corniſh forty ſix minutes and three fourths, divided in ſeven and eleven twelfths, and a half part, or in ſeven twenty three twenty fourths.

Plate XXV.

Here follows the great and ſmall Impoſt with his Arch and Ornament of the principal Gate of the Roman Order: On the right-ſide is the Impoſt and Arch; the Impoſt and Arch of the ſmall Bow ſtanding beneath; the Impoſt is high thirty one minutes and one third, divided in eleven parts and one twelfth; ſuch like part hath alſo the Aſtragal; the Arch or Bow is high twenty eight minutes, divided in ſeven parts and two thirds; the great Impoſt is high fifty five minutes and a half, divided in eight parts and eleven fifteenths; the great Arch is high thirty three minutes and ſeven eights; divided in ſeven parts and two thirds: On the left-ſide is the Ornament of the principal Gate, and is high one model twenty four minutes; the Architrave is high thirty one minutes and one third, divided in ſeven parts and two thirds; the Frize is high twenty five minutes and one twelfth; the Corniſh is high

thirty

thirty ſeven minutes and ſeven twelfths; divided in five parts and twenty three twenty fourths; under on the Frize is one liſt of one fourth part and one half minute.

Plate XXVI.

If you will make the Corinthian-Gallery without a Pedeſtal, then muſt you divide the whole heighth in twelve Models, and you ſhall place under it one groſs Baſe of one half Model high, and of the four Columns breadth muſt be nine Models, whereof the middle inter-Column muſt have two Models; they that ſtand on the right and left-ſide muſt have the inter-Column of one Model and a half: On the middle of each Column and Pilaſter muſt be one Modillon; in the outermoſt inter-Column ſhall be five ſpaces, and in the middle ſix: The four Columns have from the middle of the firſt to the middle of the laſt Column ſixteen ſpaces and Modillons; but if you make them of the breadth of ſix Columns, then muſt you divide the breadth into fourteen Models; and there comes on the ſix Columns between the Modillons twenty ſix ſpaces; and of the eight Columns the breadth muſt be nineteen Models, and there comes on the eight Columns thirty ſix ſpaces between the Modillons: The heighth of the Lights of the Doors is four ſeventhes of the flat of the Column that comes under the ſpaces of the Modillons, or in ſix parts under to the Architrave; and the Light is of ſix Models and two thirds; the breadth of the Lights is three Models and five minutes; the Ornament muſt be one fifth of the heighth of the Light, and divided likewiſe in fifteen of the like parts; give five to the Architrave, four the Frize, and ſix the Corniſh; and the Architrave it twenty ſix minutes and two thirds, the Frize twenty one minutes and one third, the Corniſh thirty two minutes: So the whole one Ornament is one Model twenty minutes.

Plate XXVII.

The ſmall Corinthian Arch muſt be four Models eight minutes wide from one Pilaſter to the other; the Pilaſter is twenty ſix minutes broad under on the Column; the Impoſt is thirty three minutes and one third high, divided in ſeven parts and nineteen twenty fourths: The height of the Arch or Bow is twenty five minutes, divided in nine parts and eleven twelfths; the Key-piece in the Arch is fifty minutes high; the Arch is higher than one half Circle ſixteen minutes; the height from above the Impoſt to the under edge off of the Baſe, ſeven Models and twenty minutes.

Plate XXVIII.

The *Corinthian* Gallery with the Pedeſtal, the Column muſt be fifteen Models and one third high; and the breadth of four Columns

eleven

eleven Models, whereof the middle inter-Column muſt be three Models, the inter-Column on the ſide muſt be two Models; on the four Columns from the middle of the firſt to the middle of the laſt, cometh twenty ſpaces and Modillons; of ſix Columns breadth is ſeventeen Models, and hath thirty two ſpaces between the Modillons; of the breadth of eight Columns is twenty three Models, and hath forty four ſpaces between the Modillons; the light of the Door is four ſeventhſ of the under-edge of the Pedeſtal with his Column to the upper-edge of the Modillon, and is eight Models thirty three minutes and one third high; the breadth of the lights of the Door is three Models fifty nine minutes and one ſixth; the Ornament muſt be one fifth of the heighth of the Lights of the Door, and is one Model forty two minutes and two fifths, divided into fifteen parts; thereof the Architrave hath five parts, and the Frize four, and the Corniſh ſix; and the Architrave is thirty four minutes, the Frize twenty ſeven minutes, the Corniſh forty one minutes. *Plate* XXIX.

If you will make the *Corinthian* Arch with the Pedeſtal, then maſt the diſtance from one Pilaſter to the other be five Models; the heighth from the under-edge of the Pedeſtal, to the upper-edge of the Impoſt, is nine Models and a half; the Impoſt is high fifty five minutes and one twelfth; the bigneſs of the Arch muſt be one tenth of the breadth, like the foregoing Arch, and is thirty minutes; the Corner-piece one Model: The Arch is higher than one half Circle twenty minutes; the heighth of the Light of the Door is three Models forty five minutes; the Ornament is high one Model thirty ſix minutes; thereof the Architrave hath thirty two minutes, divided in nine parts and five ſixths; the Frize is twenty five minutes and a half, and hath one liſt of one fifth part under the Corniſh, the Corniſh is thirty eight minutes and a half, divided in five parts and two fifths, the Pilaſter under on the Column is thirty minutes broad.

Plate XXX.

Here followeth the particular Members of the *Corinthian* Column: On the right-ſide you have the Pedeſtal and Baſe, the Pedeſtal is one third part of the heighth of the Column, and is three Models and one third, which divided in eight parts, thereof give the under *Cimacium* two parts, the neck of the Pedeſtal five parts and ſeven eighths; the upper *Cimacium* one part, the under *Cimacium* is forty five minutes; thereof give the *Plinth* thirty minutes, the other Member is fifteen minutes, divided in four parts and one eighth: On the *Cimacium* is alſo two Members, one *Torus* of three fourths, and one liſt of one third part;

part: Of the aforesaid parts the upper Cimacium is twenty two minutes and a half, divided in seven parts and three eighths, there under is one List of three eighth parts goes off from the neck; the Base is one half Model, divided in six parts and one third, and must go off the shaft of the Column one fourth part and a half part: On the left side is the Ornament and the Capital; the Capital is high one Model and one sixth, or seventy minutes, which divided in twenty three parts and one third; the Astragal is one part and two fifths of the parts of the Capital; the Ornament is one fifth part of the Columns heighth, and is two Models; this divided in fifteen parts, give five to the Architrave, four to the Frize, six to the Cornish; the Architrave is forty minutes, divided in twelve parts and one twelfth; the Frize is thirty two minutes; the Cornish is forty eight minutes, divided in seven parts and twenty three one hundred and twentieths: So much it projects, and is just 7 parts and one 5th.

Plate XXXI.

Here followeth the great and small Impost with his Arch and Ornament of the principal Gate of the Corinthian Order. On the right side is the Impost and Arch; the Impost and Arch of the small Bow stands mark'd with the Letter K.; the Impost is high thirty three minutes and one third, divided in seven parts and nineteen twenty fourth; the small Arch or Bow is high twenty five minutes, divided in nine parts and eleven twelfths; the heighth of the great Impost is fifty five minutes and seven twelfths, divided in seven and fifty three one hundred twentieths; the great Arch or Bow is thirty minutes, divided in nine parts and eleven twelfths: On the left side is the Ornament of the principal Gate, and is high one Model thirty six minutes; thereof the Architrave hath thirty two minutes, divided in nine parts and five sixths, the Frize is twenty five minutes, the Cornish thirty eight minutes and a half divided in five parts and two fifths.

Plate XXXII.

Here is shewn how you shall lessen the Columns; the Tuscan Column is one fourth smaller above than beneath; the Dorick one fifth; the Ionick one sixth; the Roman or Composita is one seventh; the Corinthian is one eighth: Which are to be divided in twelve equal parts, three of which must go up in a straight Line in the Tuscan-Column, of the Ionick three and a half go up in a straight Line; and the Corinthian four parts go strait up; of the Dorick and Roman or Composita, is a measure between the Tuscan and Ionick, and between the Ionick and Corinthian; the other lessenings Men may easily see how they shall make them in the Figure here set down.

Plate XXXIII.

Shews how you may make the Corinthian Base, and the upper and under Cimacium, with his Diagonal Lines for the inlarging the Projecture.

Plate XXXIV.

Sheweth how the Corinthian Ornament is to be made, as the Architrave, Frize and Cornish, with his Diagonal Lines for inlarging the Projecture, easy to be understood; so draw one Diagonal Line after a perfect Quadrat of the whole projecture of the Cornish; and in these Diagonal Lines must all the perpendicular Lines come for the members that are in the projecture; and this outermost end must we then after this measure draw with the said

Diagonal

Diagonal, ſo that in the croſſing, you make right Angles, that the height of the drawing members be parallel near to the Diagonal.

Plate XXXV.

This is the Ornament of the Corinthian Order of the principal Gate, and is one model thirty ſix minutes high, (as before is declared) thereof the Architrave hath thirty two minutes; the Frize twenty five minutes and a hal f the Corniſh thirty eight minutes and a half, the Architrave thirty two minutes, divided into nine parts and five ſixths; thereof ſticks farther out as the outer edge of the Door-ſtile ſeven parts and two thirds, or eight minutes and a half farther for corniſhing; and let the Ears of the Architrave be ſeventeen parts long; of the foregiven parts, or fifty five minutes and a half to underneath, beſides all other the Corniſhing of the Architraves, as you may ſee in the Figure; the Frize is twenty five minutes and a half, divided in ſeven parts for making the Voluta or Scroll, and draw one Line up: The fourth part, or fourteen minutes and a half from above off right parallels; ſo there remains three parts or eleven minutes for the ſtanding out beneath, and the eye of the Scroll is one ſeventh part, or three minutes and nine fourteenths of the heighth of the Frize; and draw a Line perpendicular from above to the under edge of the Ear of the Architrave, and where the Lines cut croſs each other, here is the middle of your Eye: Stick out croſs four parts ſixteen minutes and a half near to the outſide, and three parts and a half, or twelve minutes and a half to the inſide, and draw your Scroll then after this manner here drawn: The Scroll or Voluta beneath is one fifth part five and a half ſmaller, as the upper Scroll is, and is high twenty minutes, and the breadth twenty two minutes and a half: Divide the heighth in eight parts, and draw a parallel Line of four parts and a half, or eleven minutes and one fourth from beneath to above, and there the parallel Line cut croſs the perpendicular is the middle of the Eye, ſticks out croſs three parts and one half, or eight minutes and three fourths to above, and four parts or ten minutes to the outſide; and there remains over five parts or twelve minutes and a half to the inſide; farther all that belongs to it may you in the Figure here plainly ſee; as, for the breadth of the Scroll in two parts and five eighths of the Corniſhes given parts, or nineteen minutes; the other Members before may be ſeen in the Figure.

Plate XXXVI.

Here is ſhown two Chimny-Mantils, with their Profile.

Plate XXXVII.

Here is ſhown the ground of the building of the Lord *Strozzi* ſtanding at *Florence*, the like is deſcrib'd in the Author's third Book in the ſeventh Chapter.

Plate XXXVIII.

The half of the Building on the Ground to be ſeen inwards of the Buliding of the Lord *Strozzi*.

Plate XXXIX

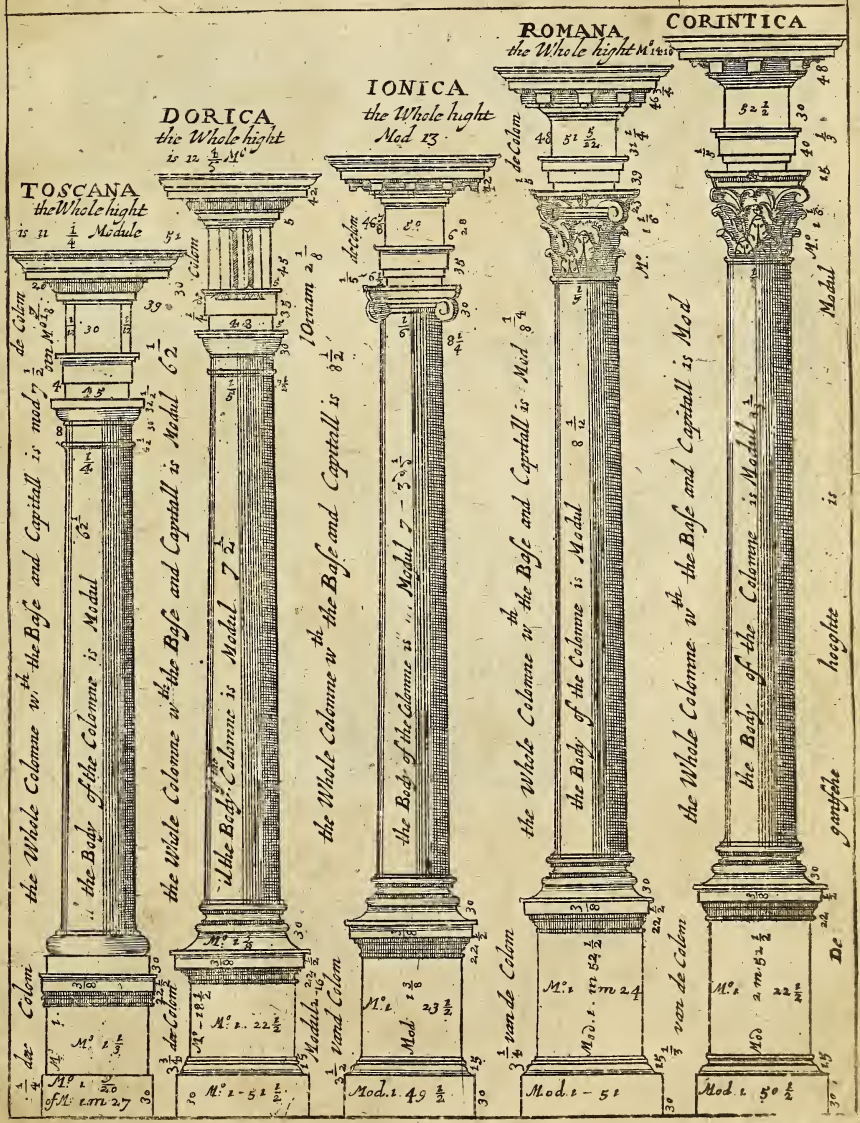
The other half with the upriſing to be ſeen with the foreſide of the foreſaid Building.

Plate XL.

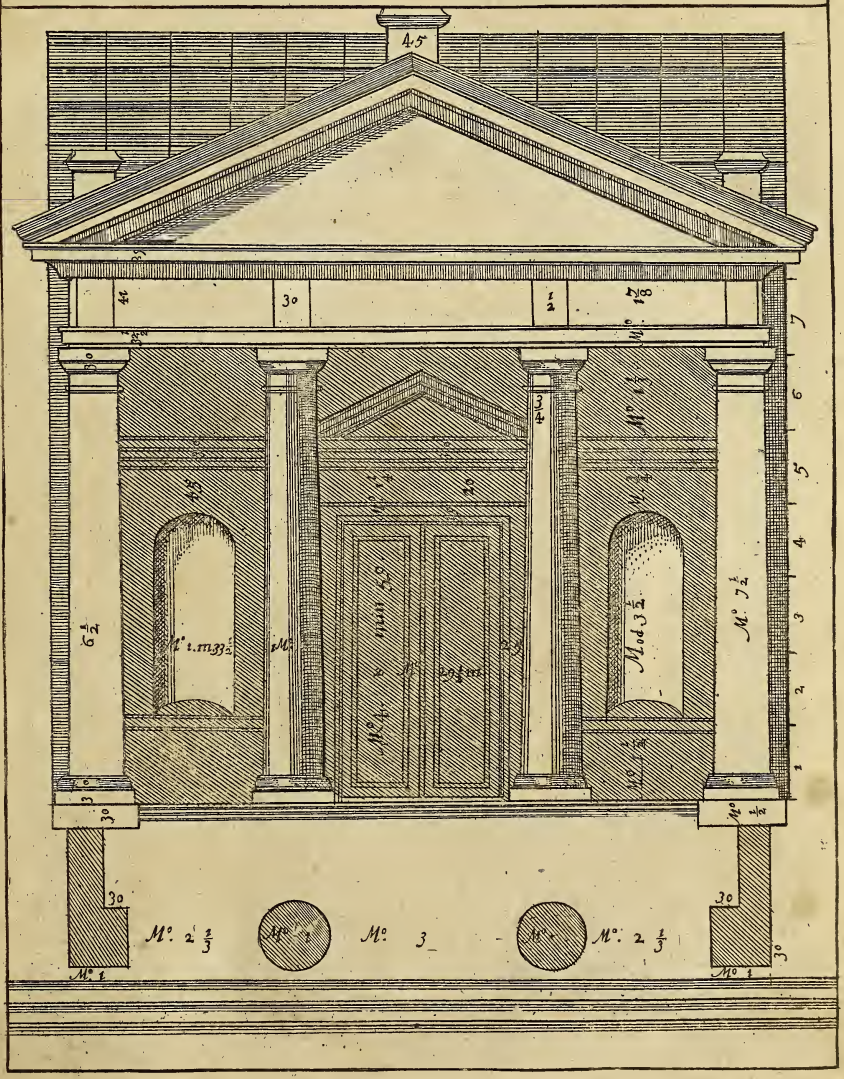
Here we have the underſide of the Corniſh of all the Five Columns, *A* of the *Tuſcan*, *B* of the *Dorick*, *C* the *Ionick*, *D* the *Roman* or *Compoſita*, E the *Corinthian*.

To the Bookbinder. Place the Cuts from No. 1 *to* 40. *between this and Folio* 17.

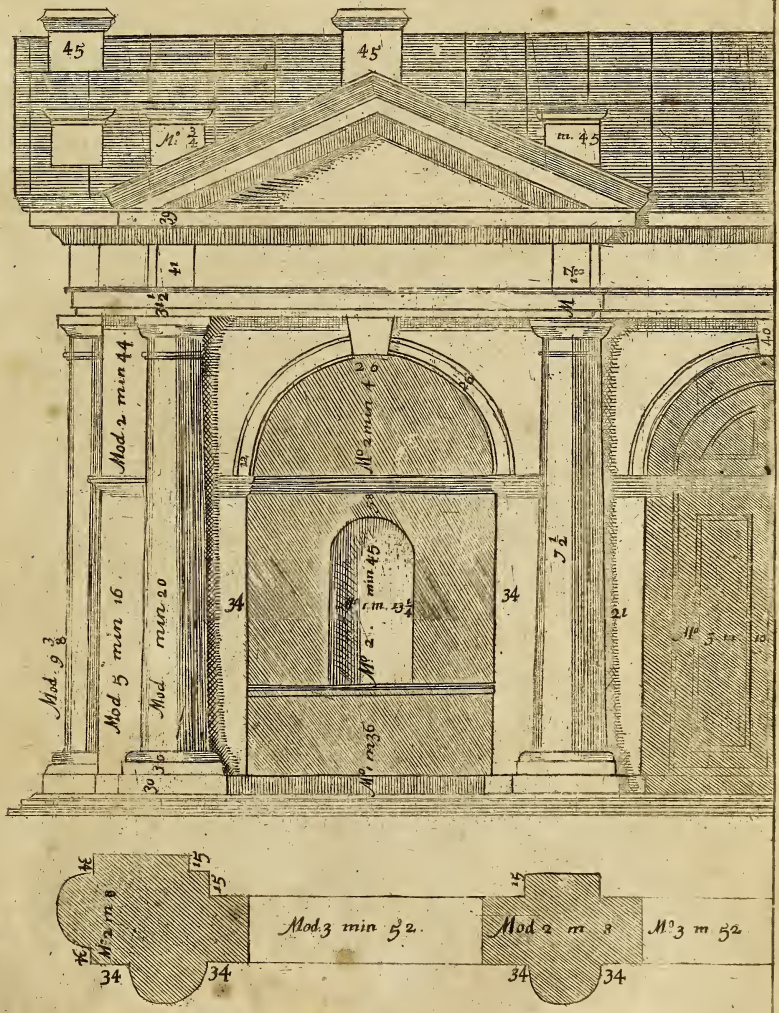
THE ORDER OF THE FIVE COLLOMNES


TOSCANA
the Whole hight is 11 1/4 Module
DORICA
the Whole hight is 12 4/5 M.
IONICA
the Whole hight Mod 13
ROMANA
the Whole hight M. 14 1/2
CORINTICA
the Whole Colomne w.th the Base and Capitall is mad 7 1/2 de Colom
the Body of the Colomne is Modul 6 2
the Whole Colomne w.th the Base and Capitall is Modul 7 2
the Body of the Colomne is Modul 7 2
the Whole Colomne w.th the Base and Capitall is 8 1/2
the Body of the Colomne is Modul 7 - 3 1/2
the Whole Colomne w.th the Base and Capitall is Mod 8 1/4
the Body of the Colomne is Modul 8 1/12
the Whole Colomne w.th the Base and Capitall is Mod
the Body of the Colomne is Modul
Modul
Mod. 1 - 51
Mod. 1 50 1/2

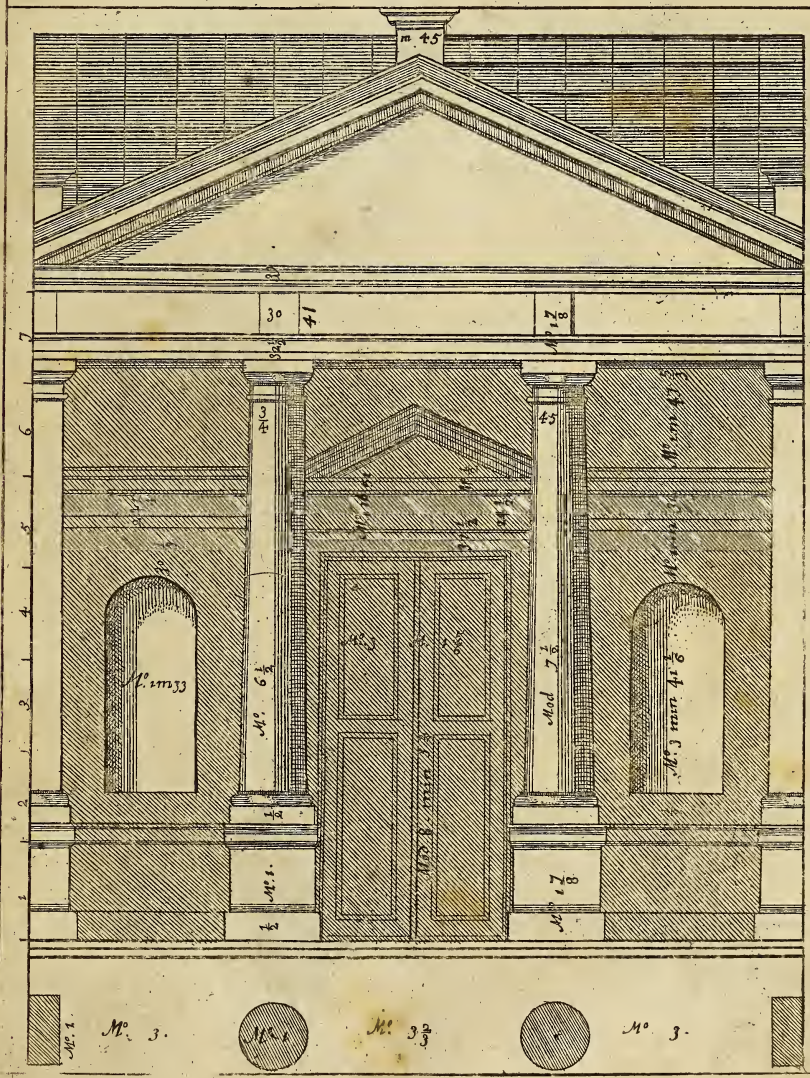
The TUSCAN Colomne



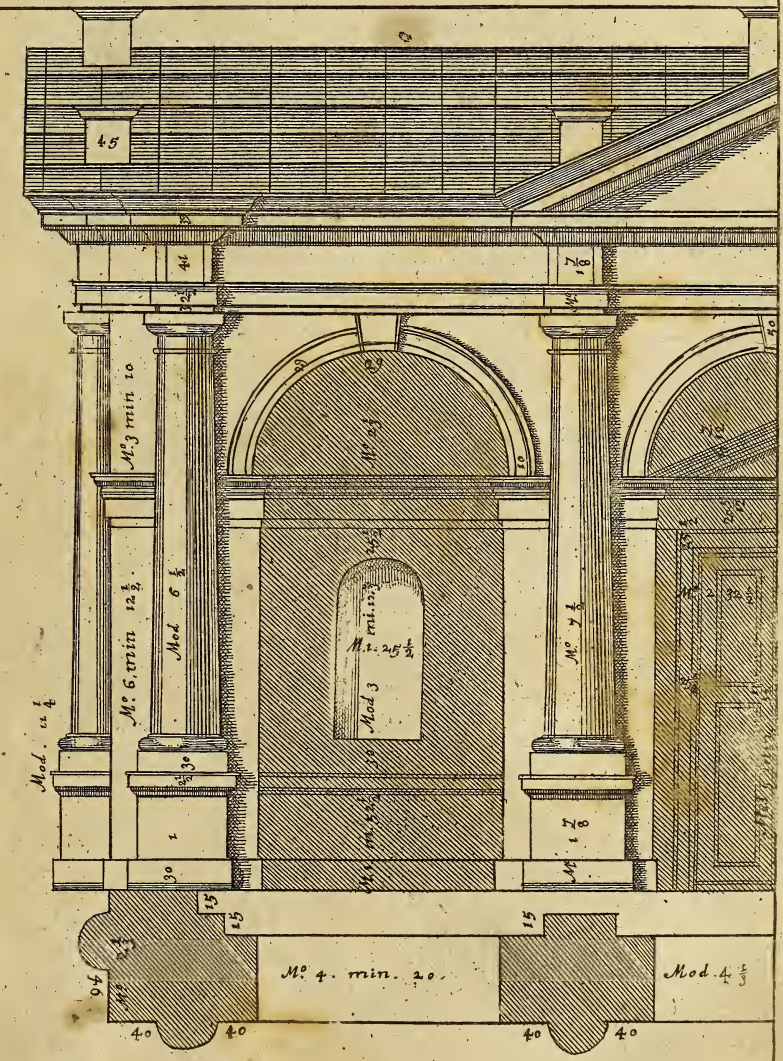
The TUSCAN Artch



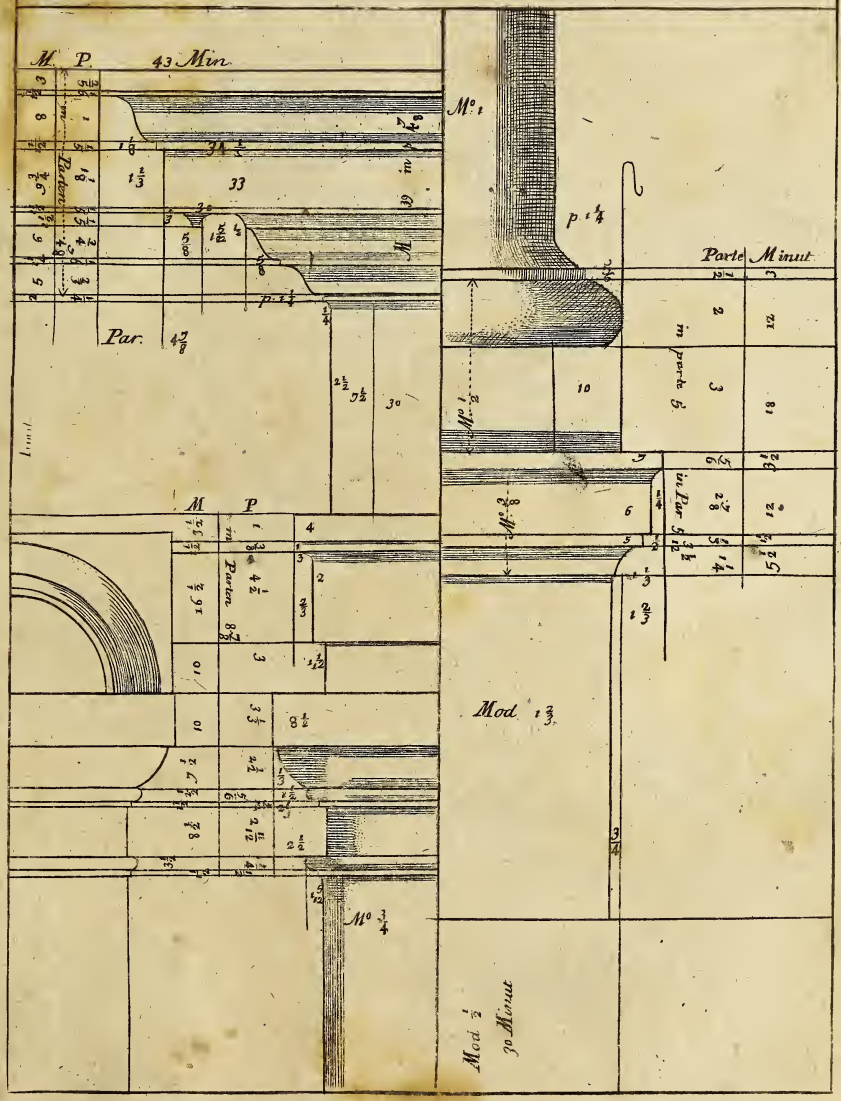
The TUSCAN Colomne with y^e Pedestall



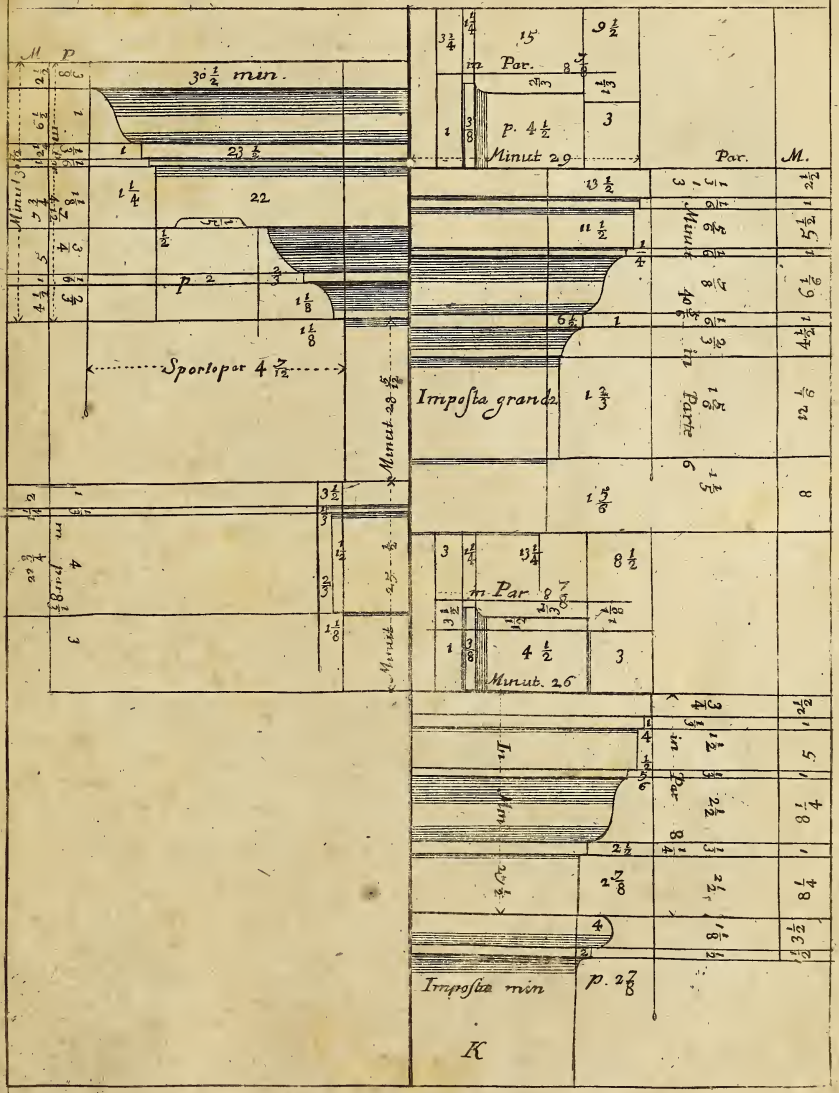
The TUSCAN Artch w.th ye Pedestall



The Pedestall Base and Ornament of the TUSCAN

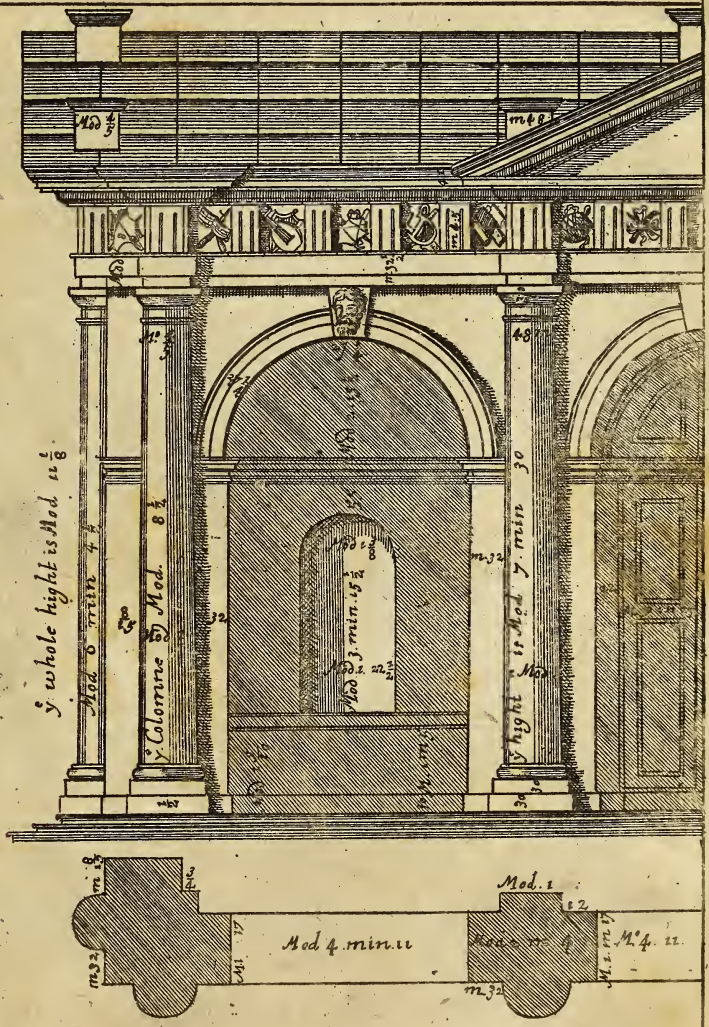


Impoſts and Ornament of ye TUSCAN

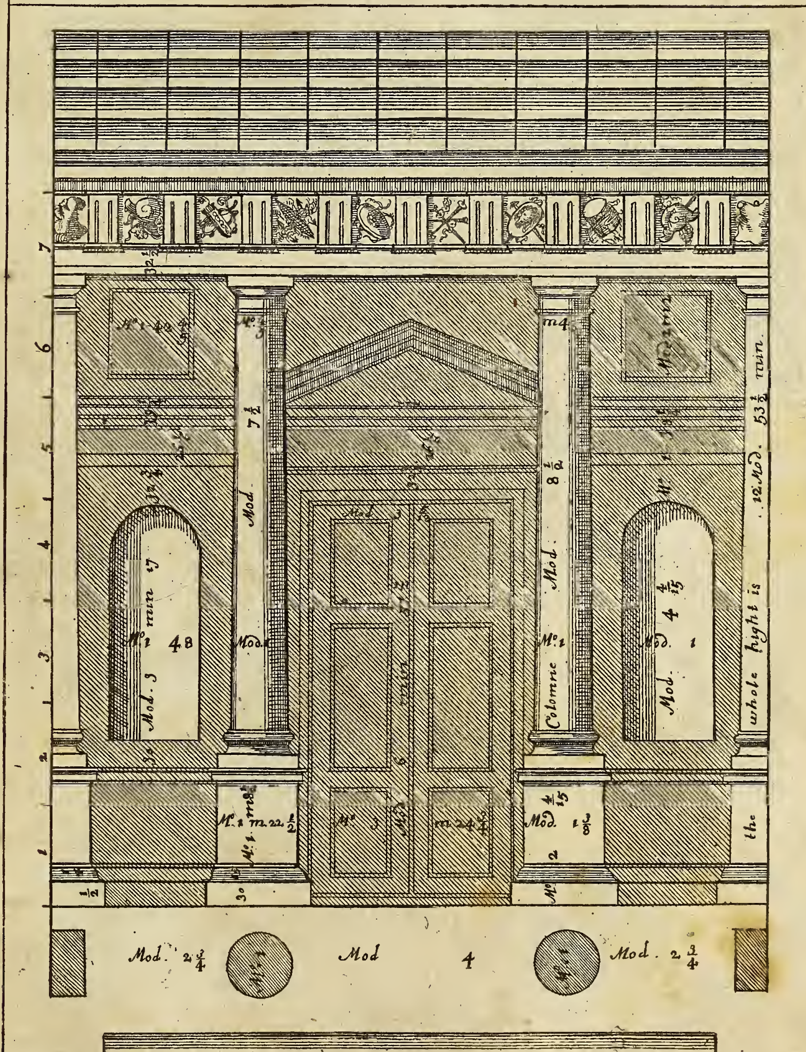


The DORICK Colomne

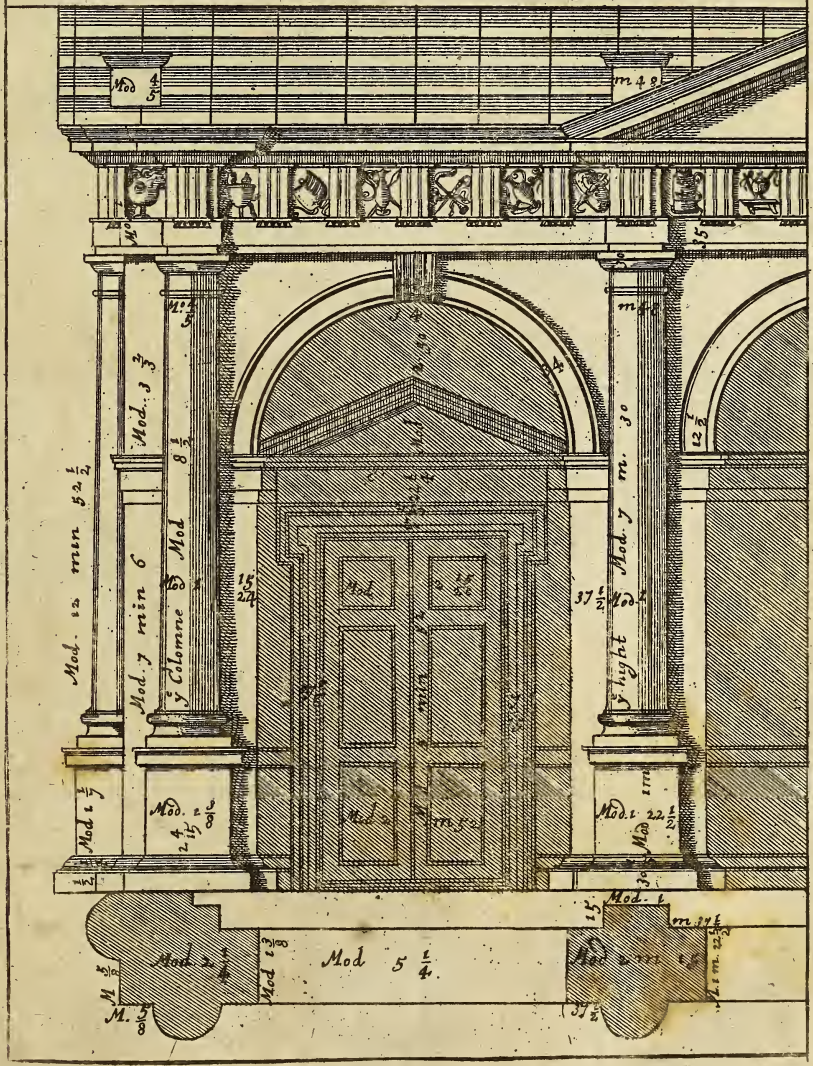
The DORICK Arch



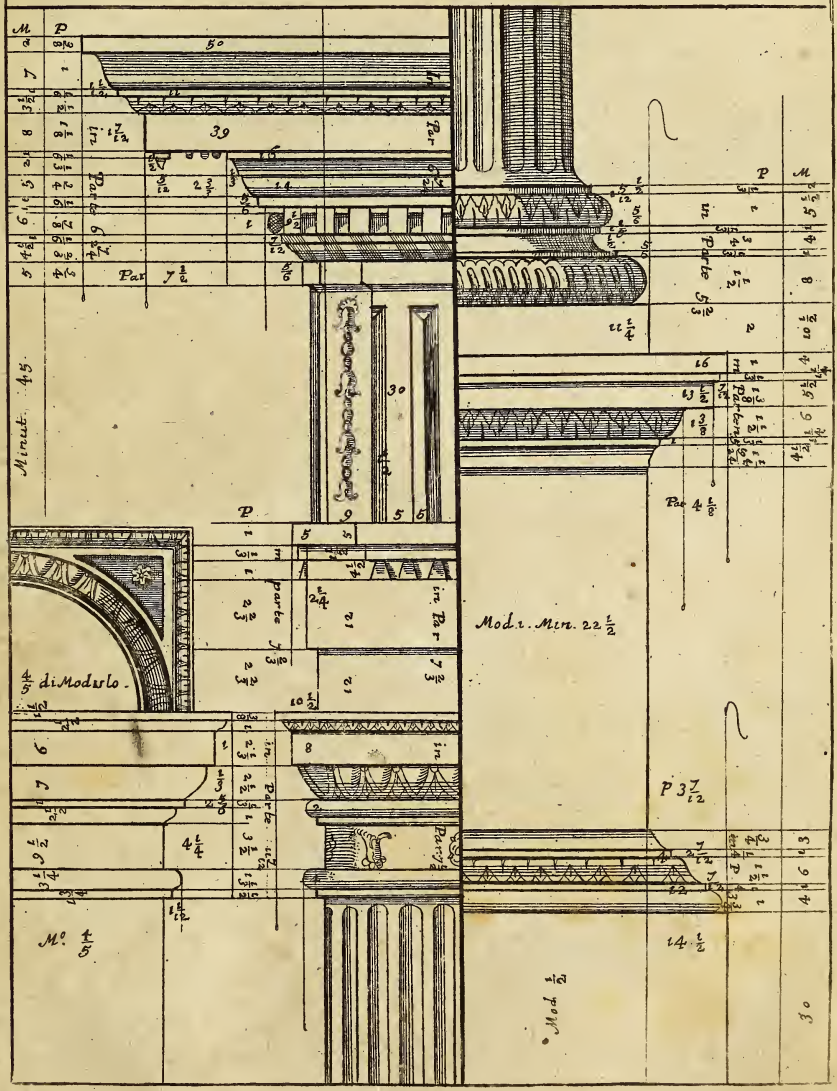
The DORICK Colomne with the Pedestall:



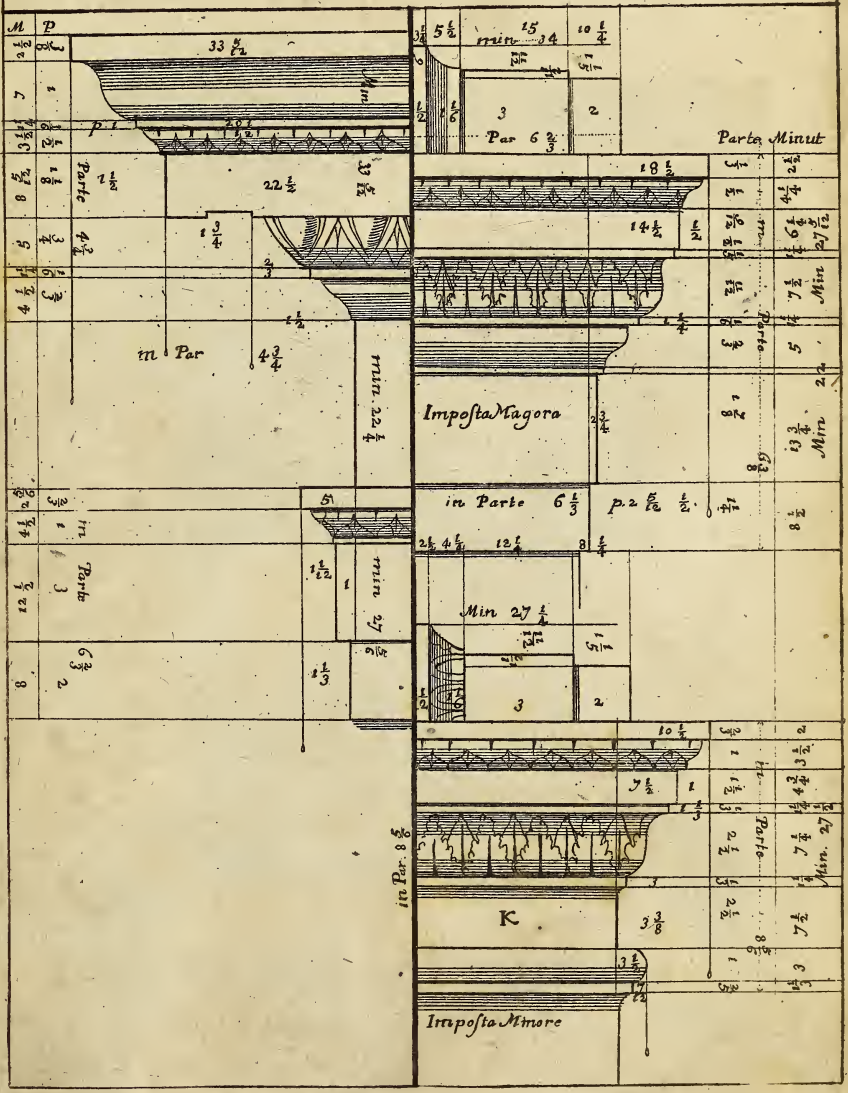
The DORICK Arch w.th e y.e Pedestall



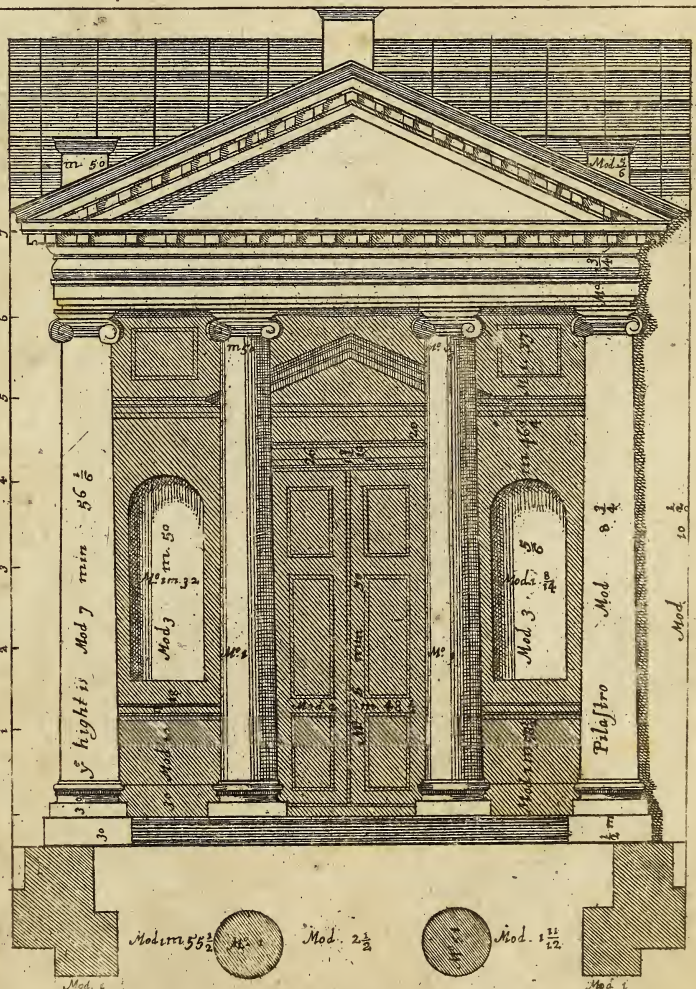
Pedestall. Base and Ornament of the DORICK



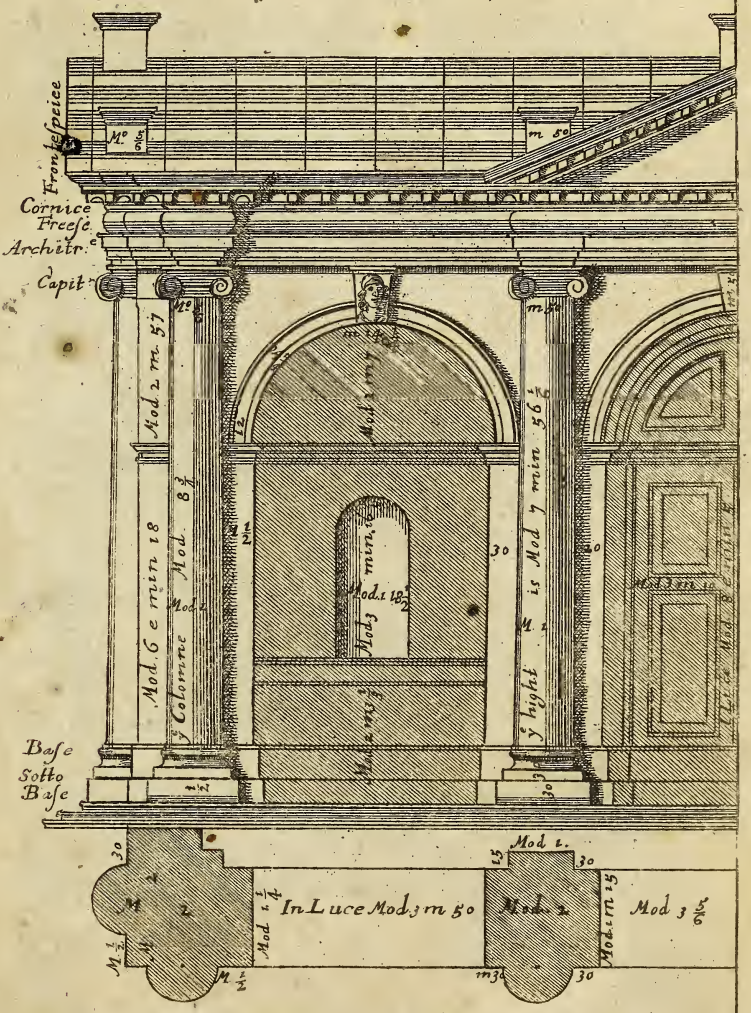
Impostś and Ornament of ye DORICK order



The IONICK Colomne



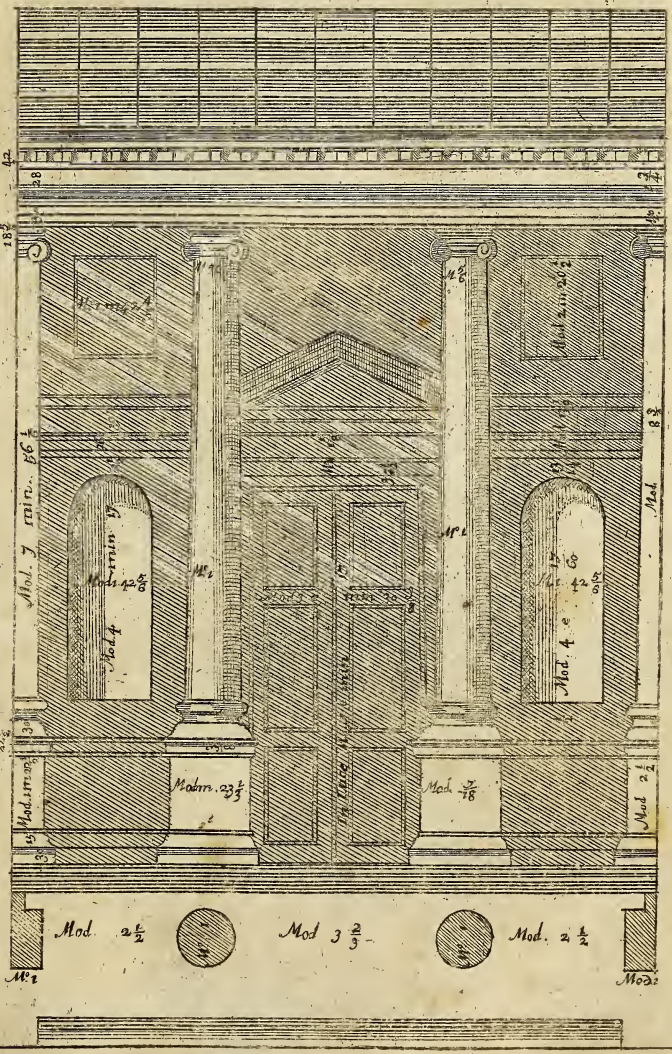
The IONICK Arch



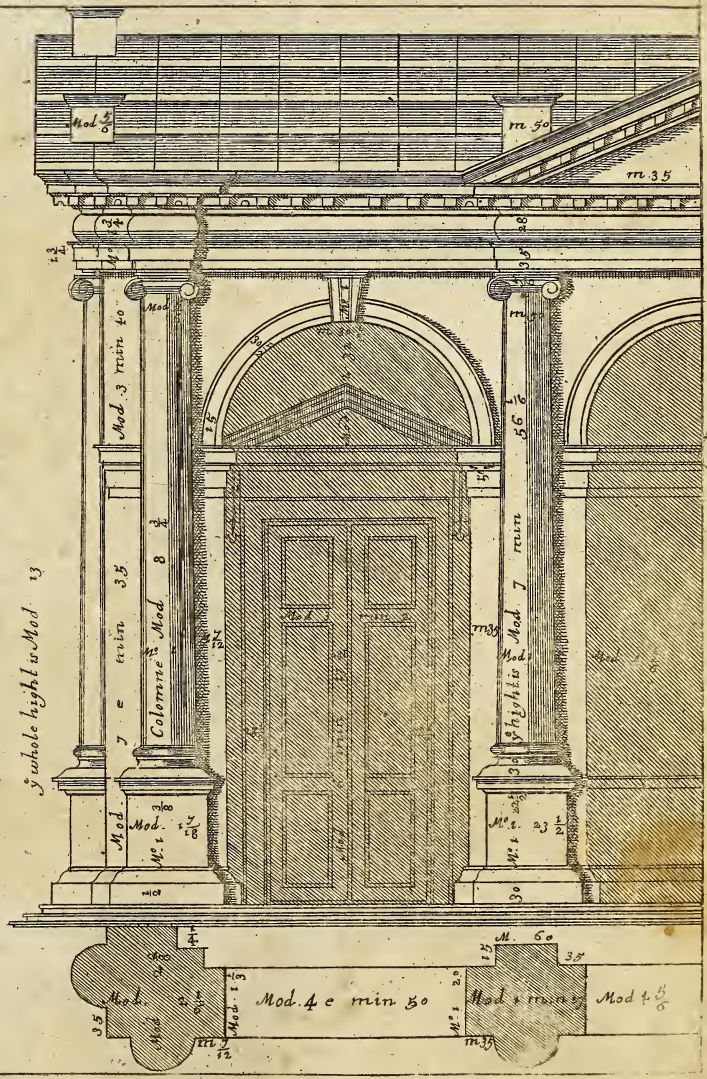
March 23 1737 Sarah [illegible]

Her Book
But on it She Dos
Nott Look

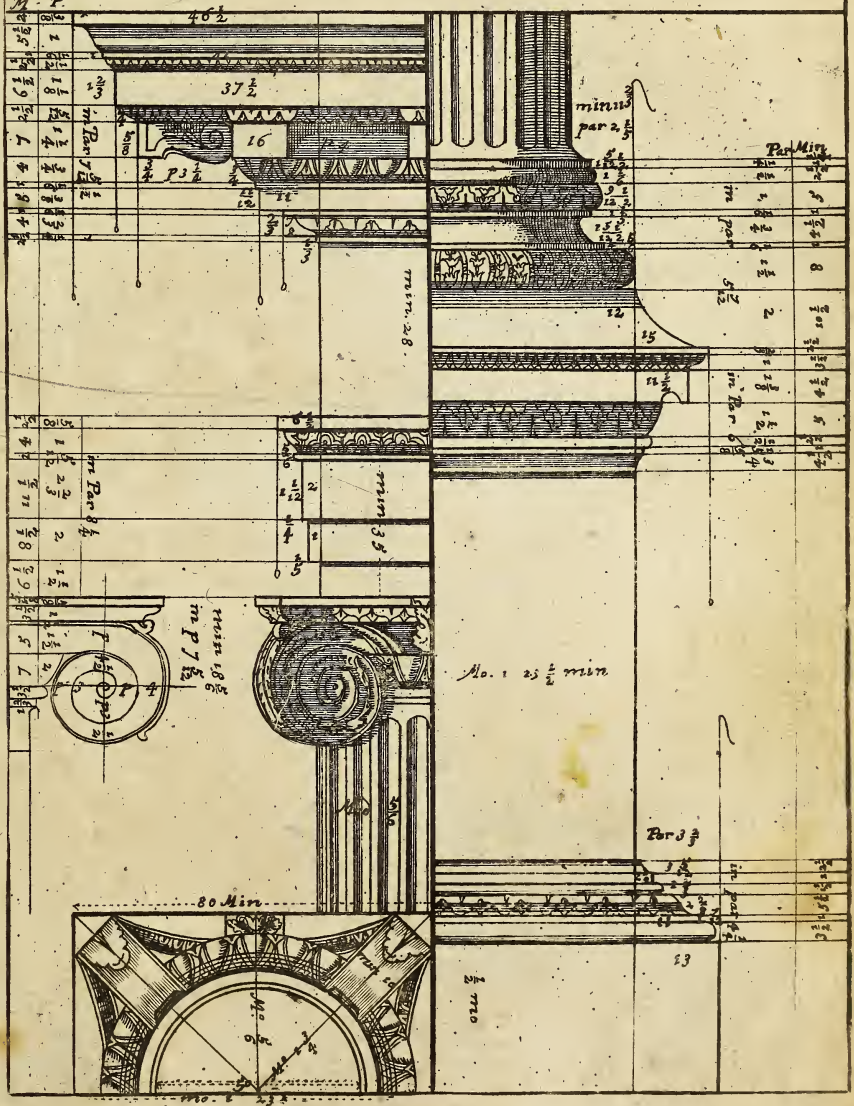
The IONICK Colomne wth the Pedestall.



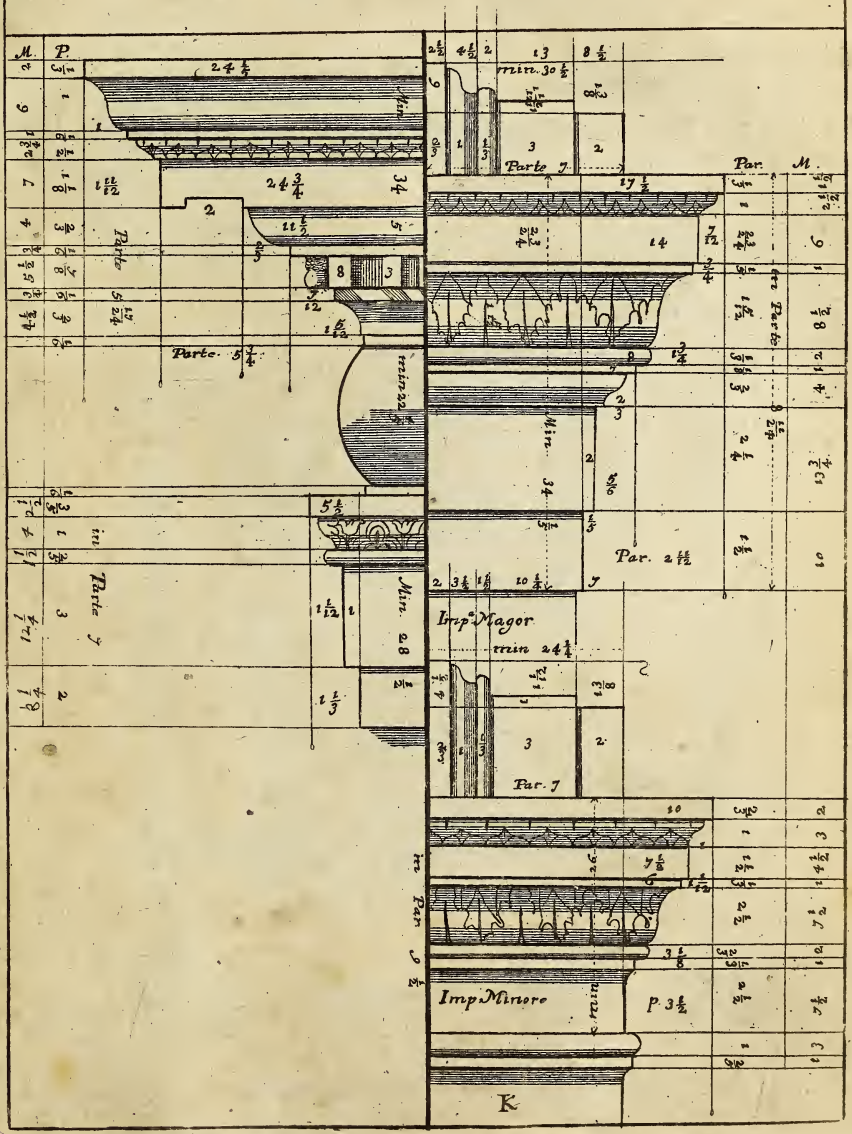
The IONICK Arch w.th y.e Pedestall



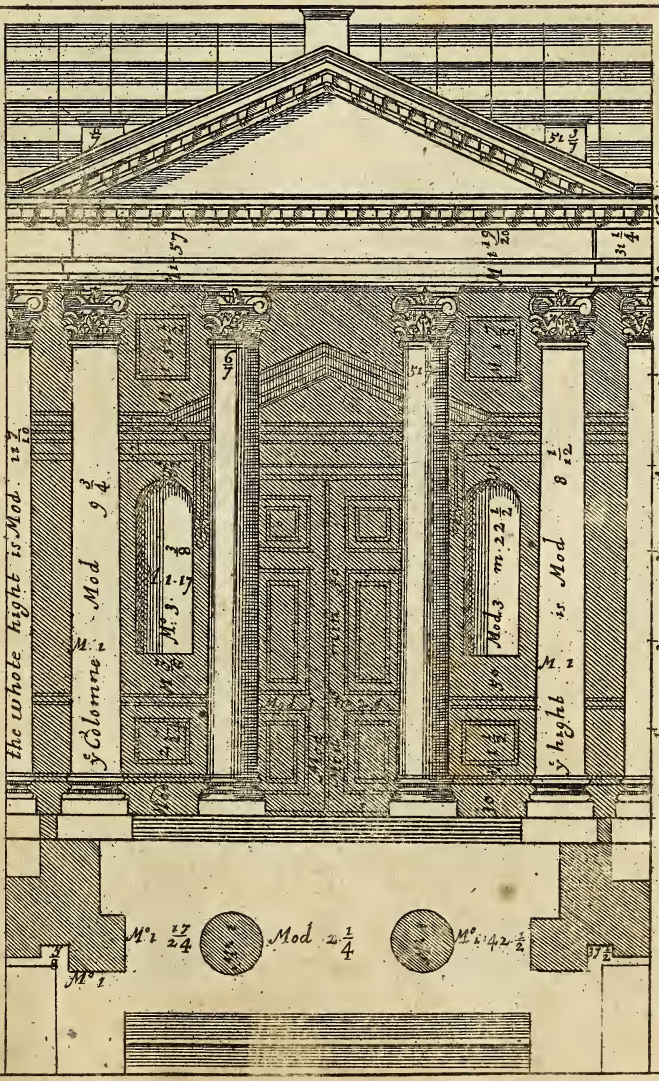
Pedestall Base and Ornament of the IONICK



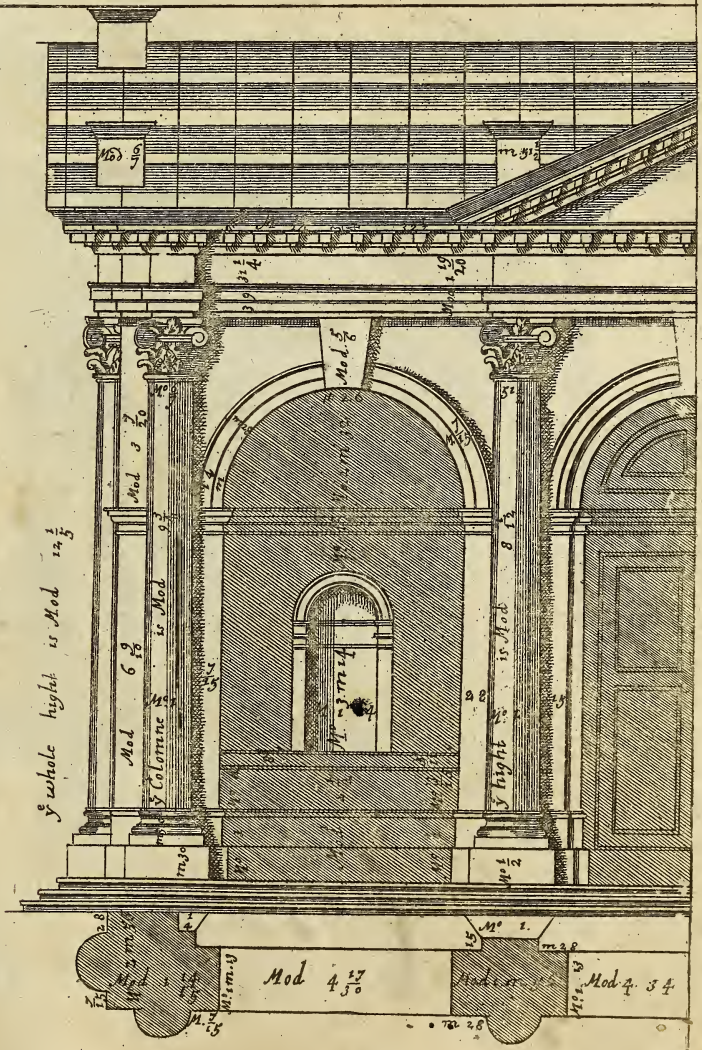
Impoſts and Ornament of ye IONICK order



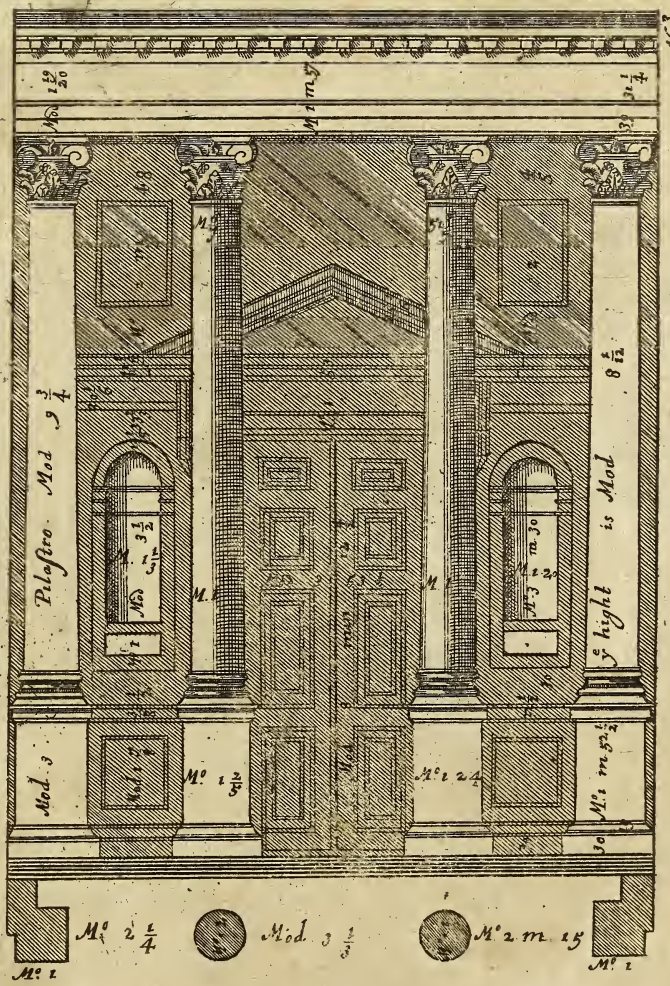
The ROMAN Colomne



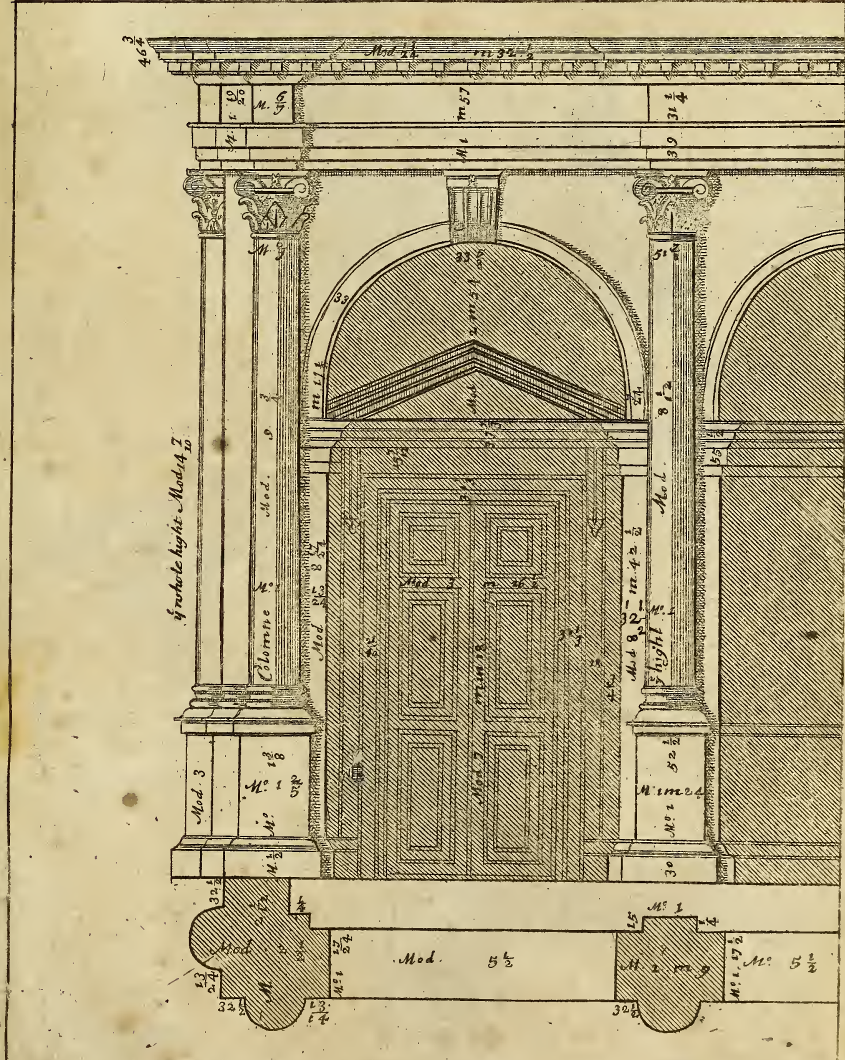
The ROMAN Arch



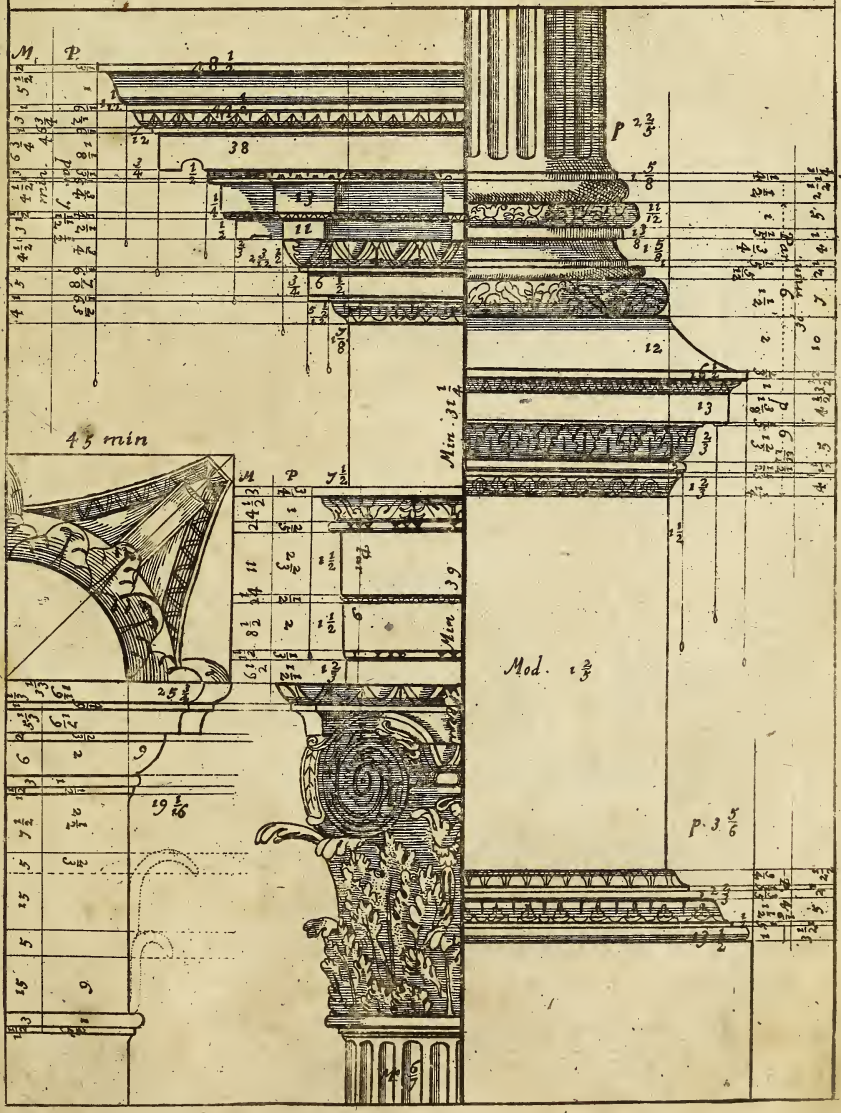
ye ROMAN Colomne the wye
Pedestall



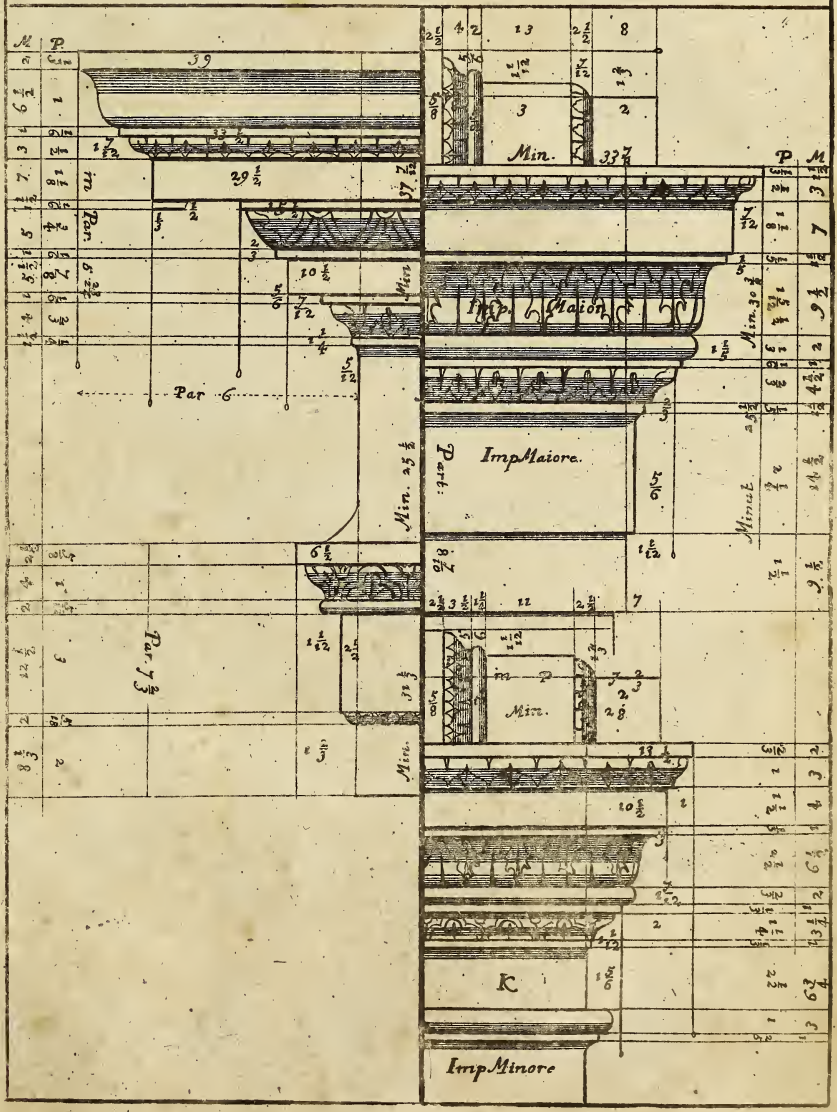
The ROMAN Artch with ye Pedestall



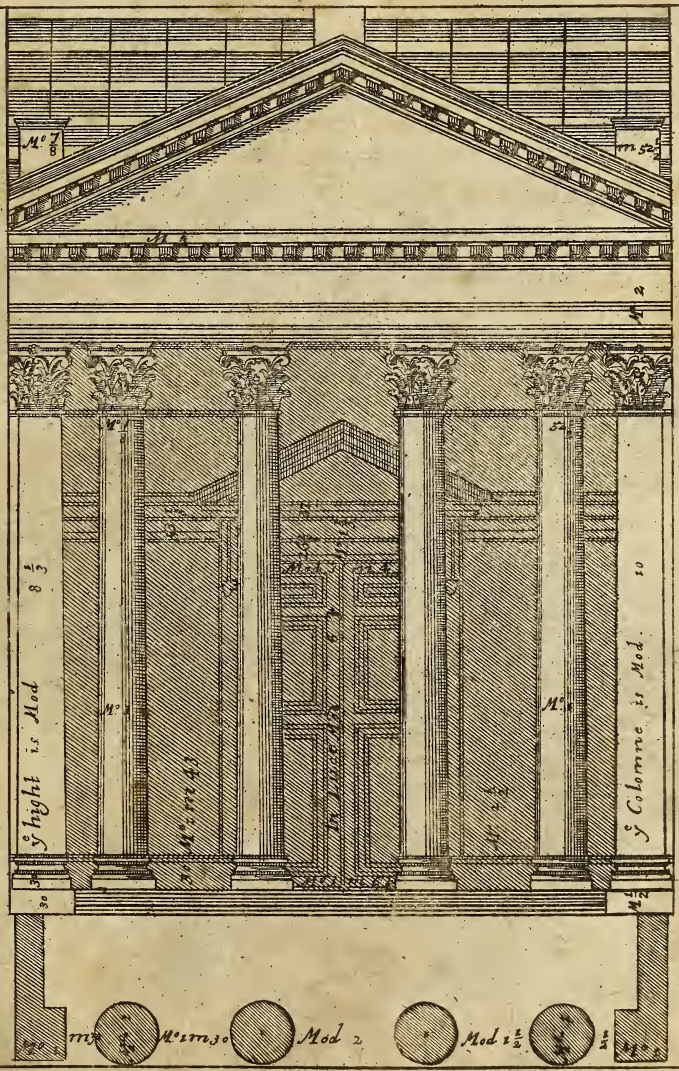
Pedestall Base and Ornament of y^e ROMAN

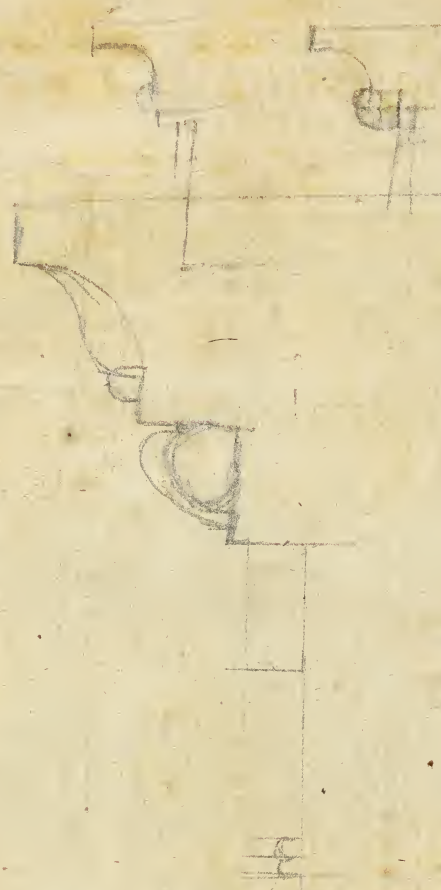


Impoſts and Ornament of y.e ROMAN

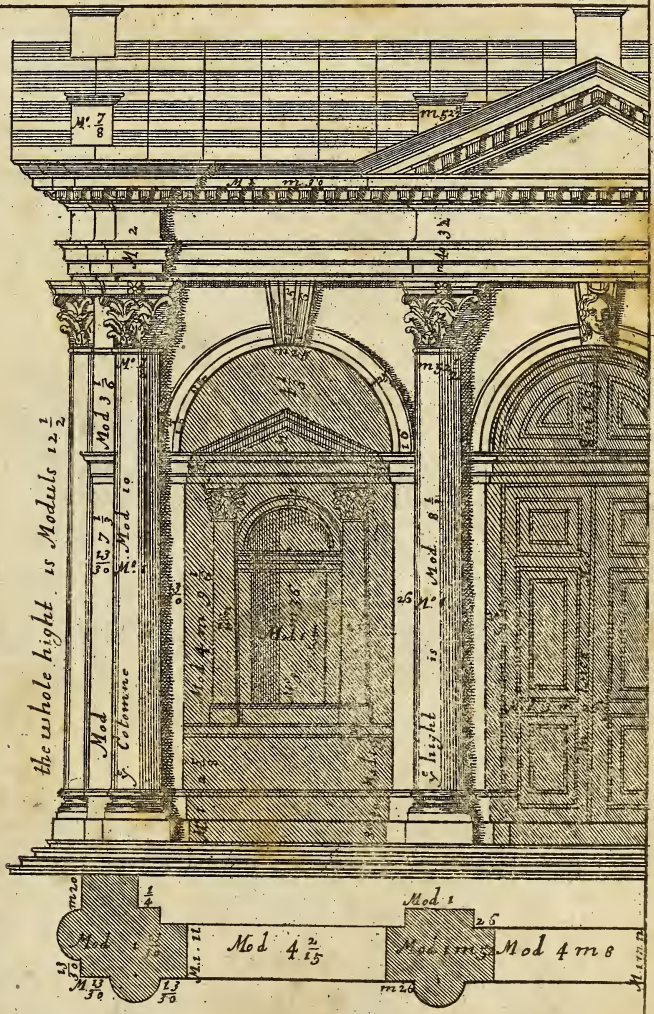


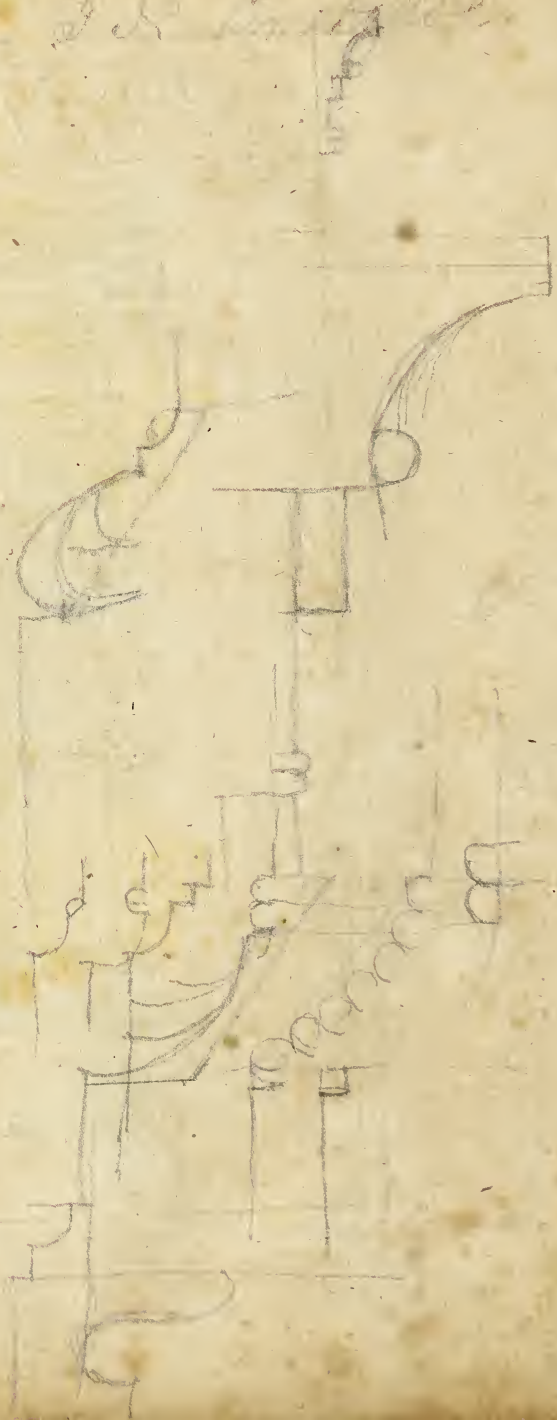
The CORINTHIAN Colomne



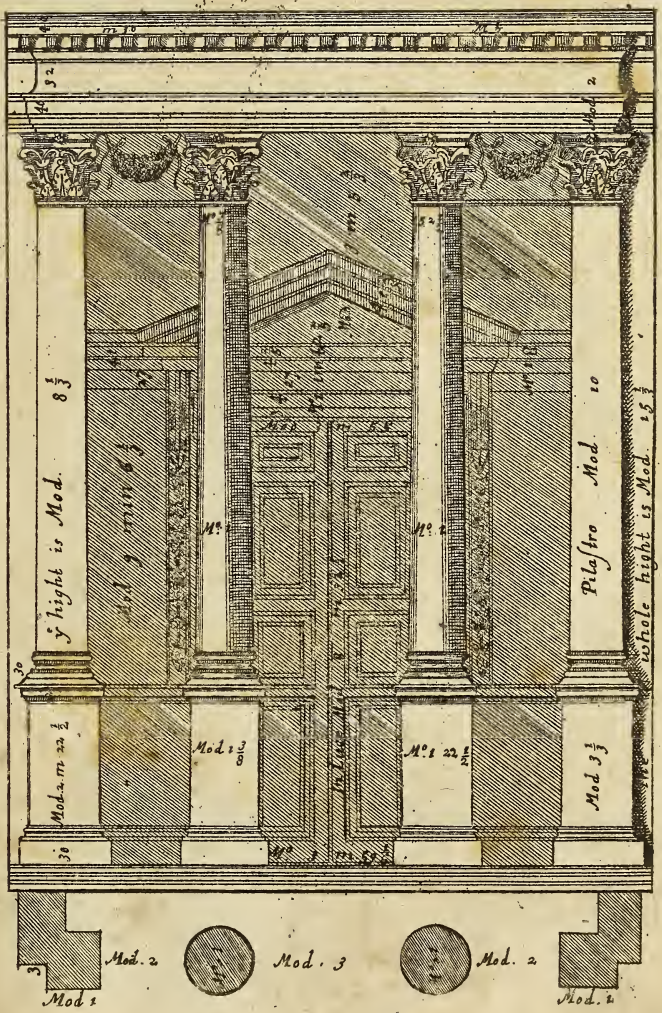


The CORINTHIAN Arch



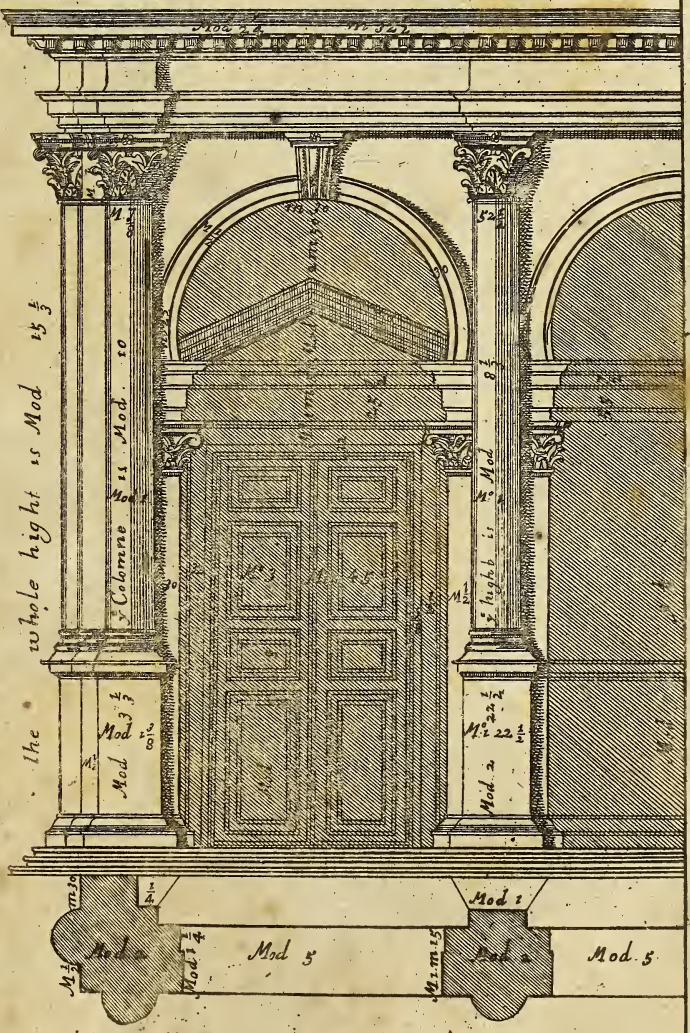


The CORINTHIAN Colomne w.th the Pedestall



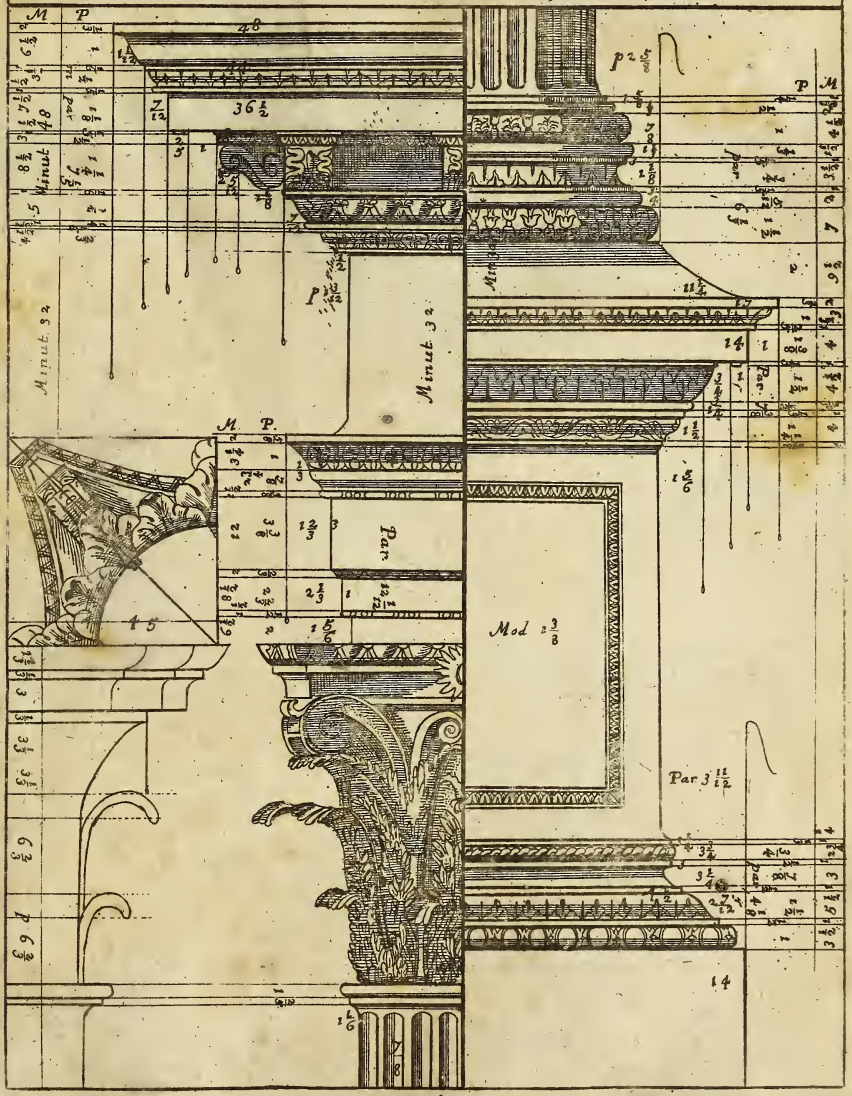
The CORINTHIAN Archway

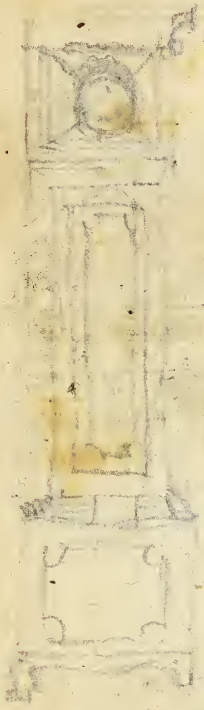
Pedestall

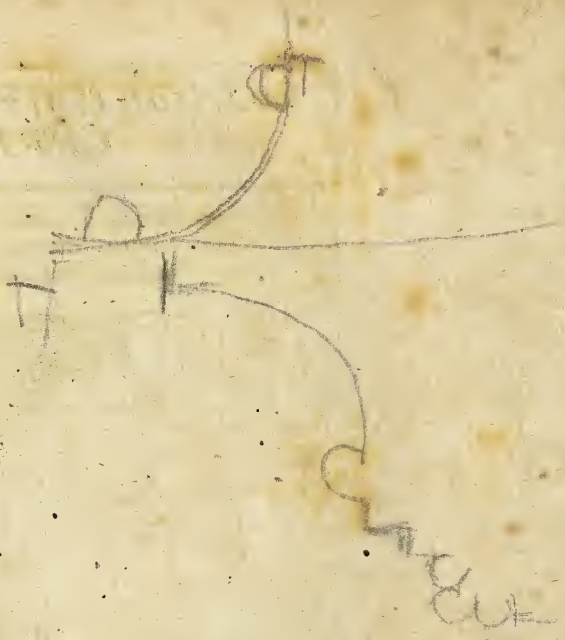


Pedestall Base and Ornament of y. CORINTHIAN

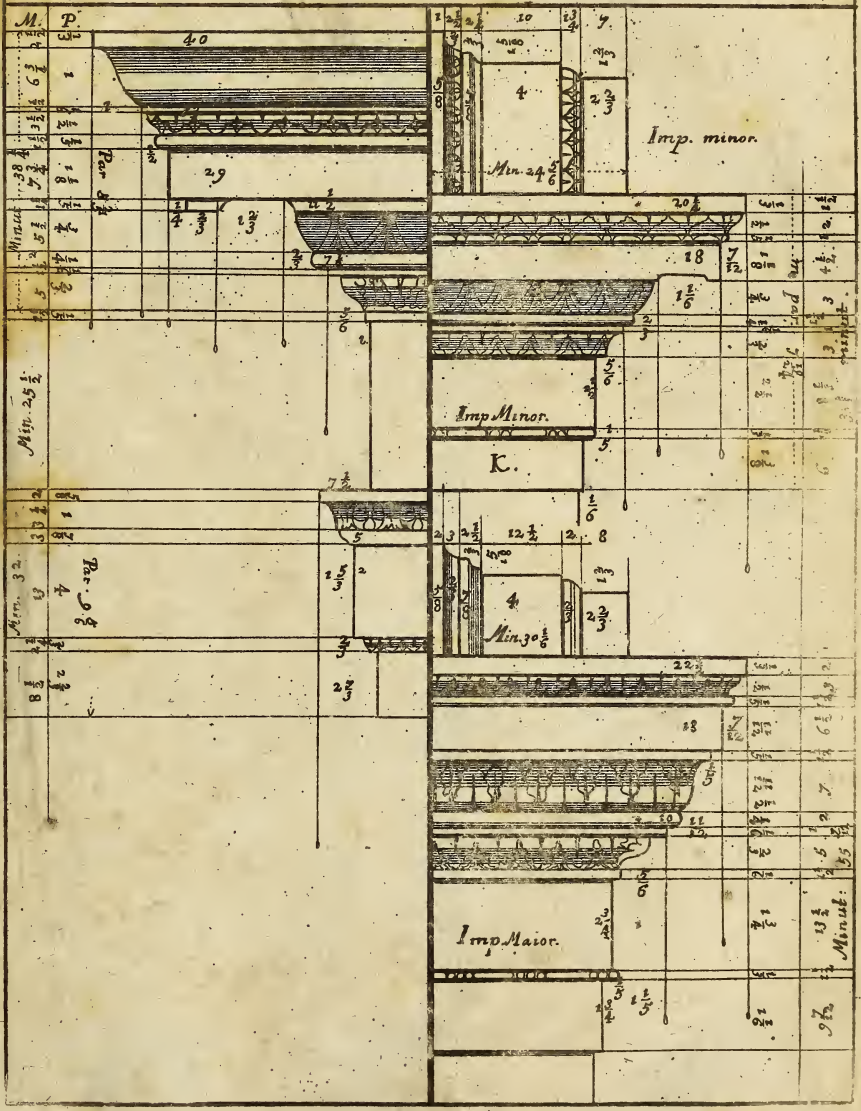
e 30





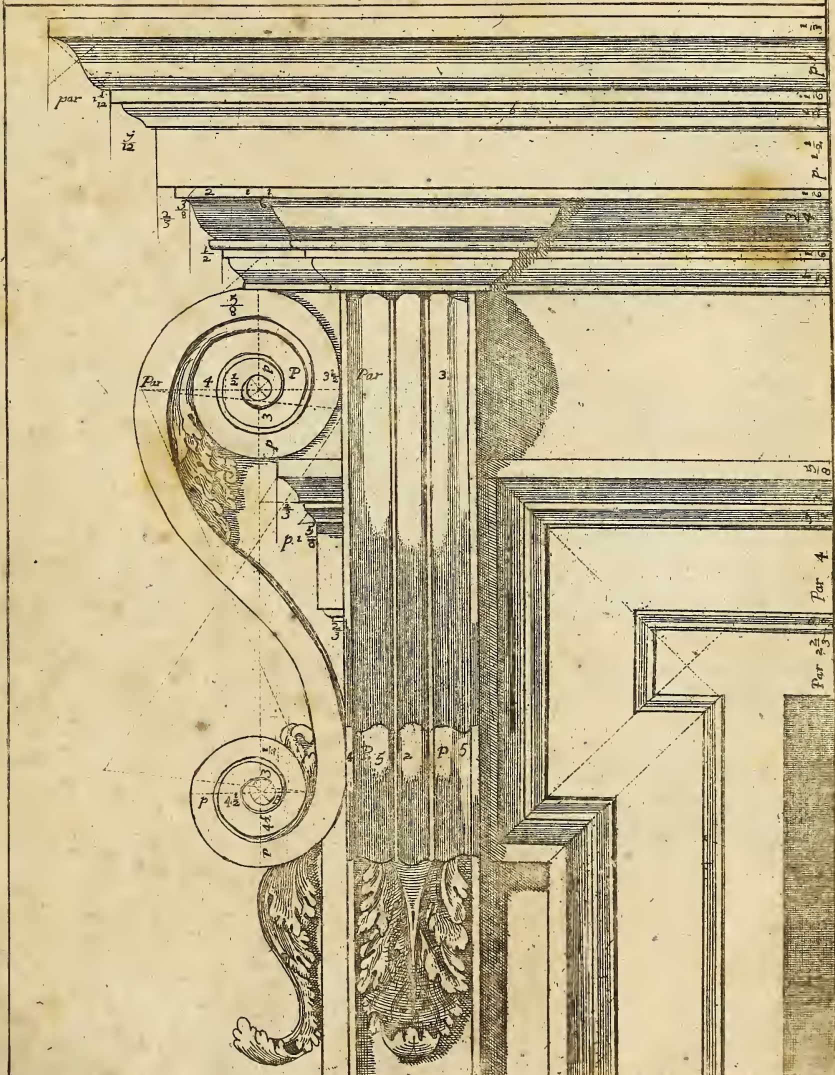


Imposts and Ornament of ye CORINTHIAN

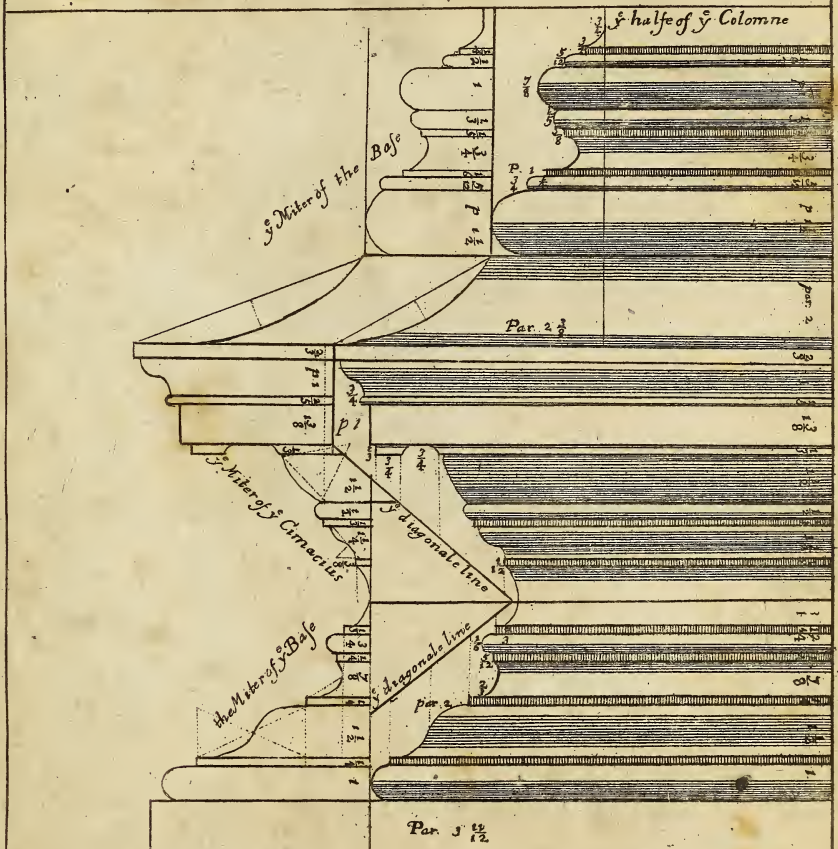


Mod.
Mod. 1
Centina ofte Vadenging om de Colomnen te Verkryen.
Aslofe and sure rule for the diminishing of the Colomne
Mod.
Mod. 1
Cironia ofte Raggio welke gebruyckt worden in't maken der Colomnen
Asure and sofe way for the making of the body of the Colomne
Mod.
Mod. 1
Subtyle en vaste Regel of Inda gestaden om het Peyselt der Colomnen te maken
Asure and sofe rule for the Cutting of the line on the making of the Bilos of the Glomne

The Ornament of A CORINTHIAN Doare or window.

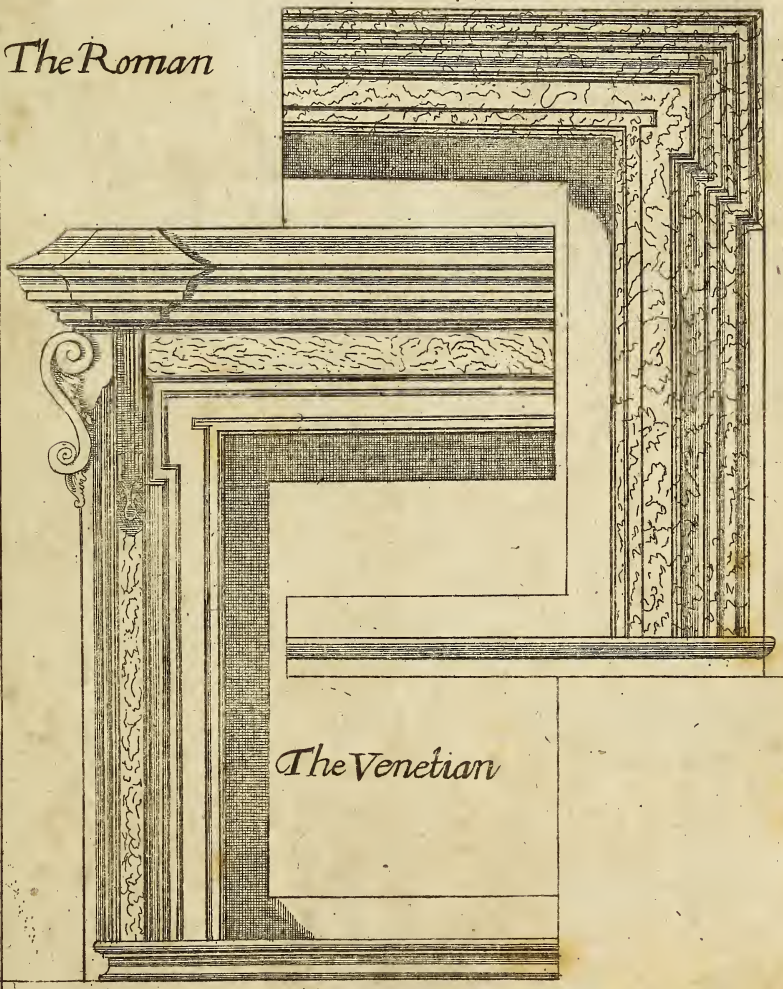


The Base of the CORINTHIAN order


ye halfe of ye Colomne
ye Miter of the Base
Par. 2 3/4
ye Miter of ye Cimacium
ye diagonale line
the Miter of ye Base
ye diagonale line
Par. 3 1/2

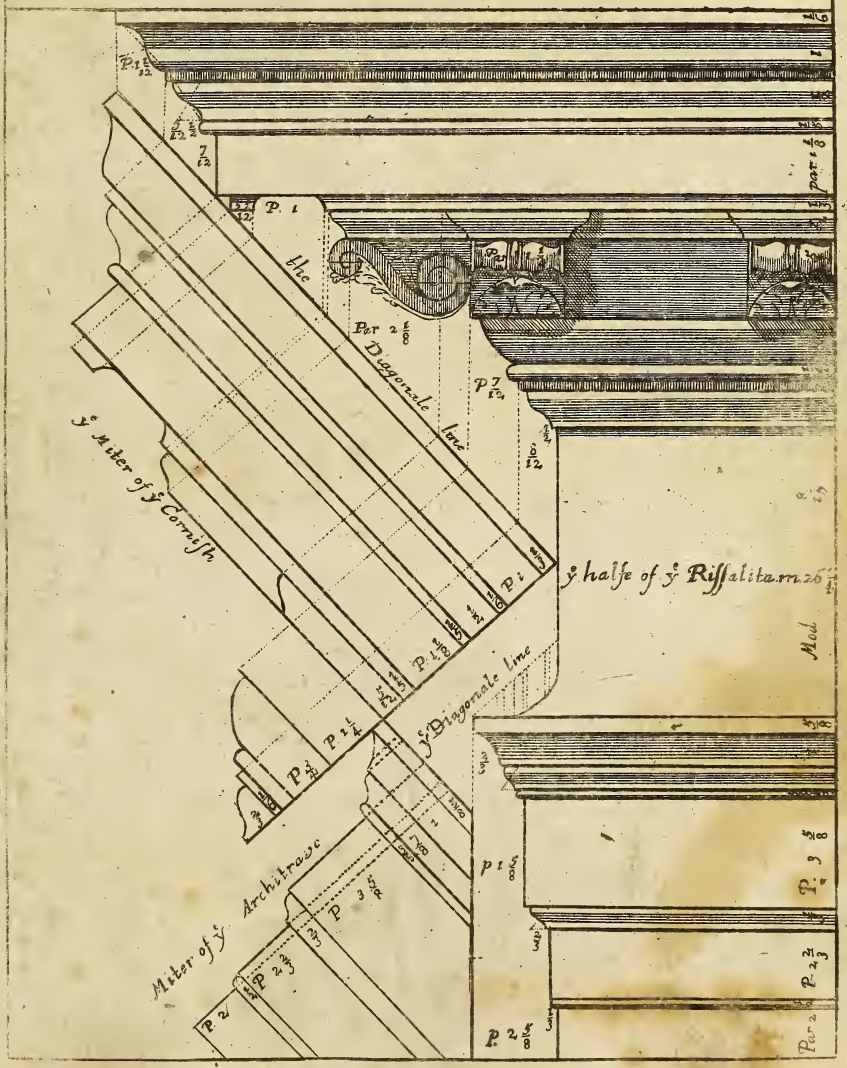
Two Mantle trees for a Chimney:

The Roman

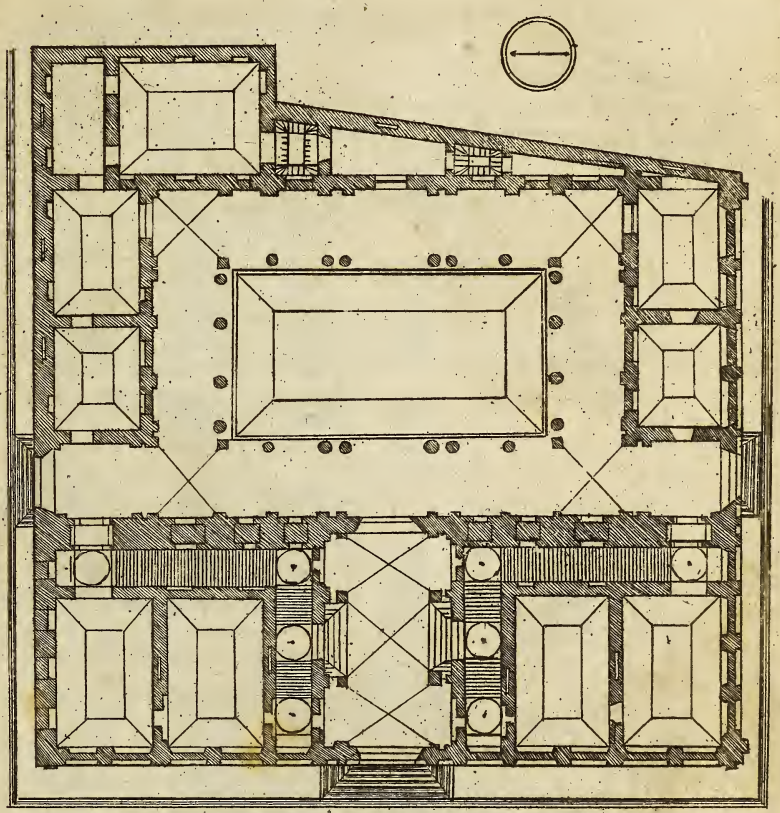


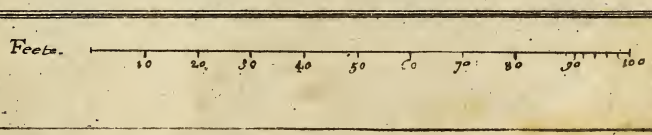
The Venetian

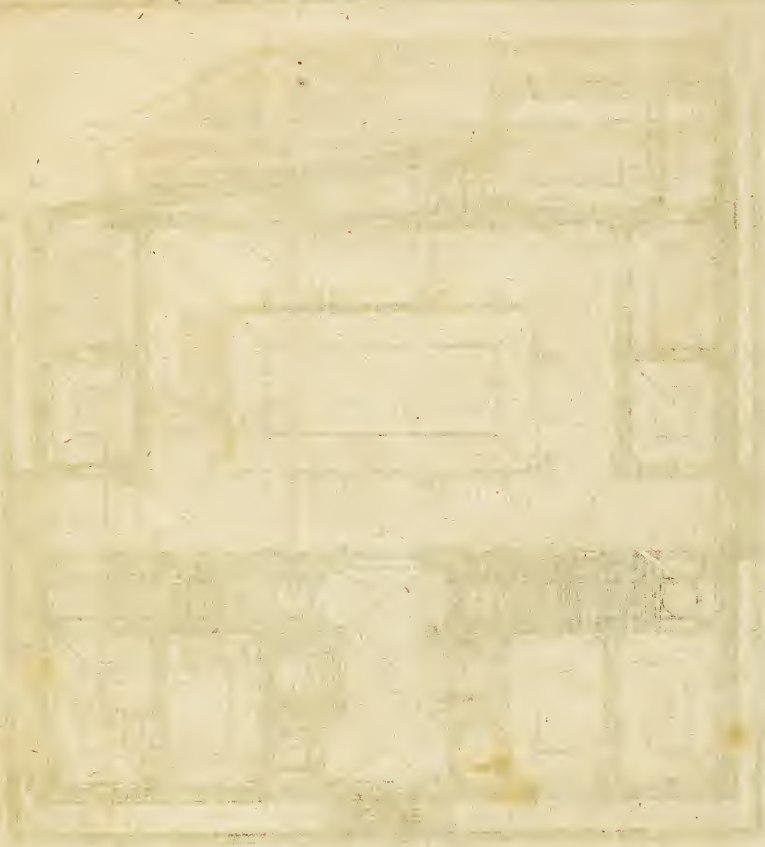
The CORINTHIAN Ornament



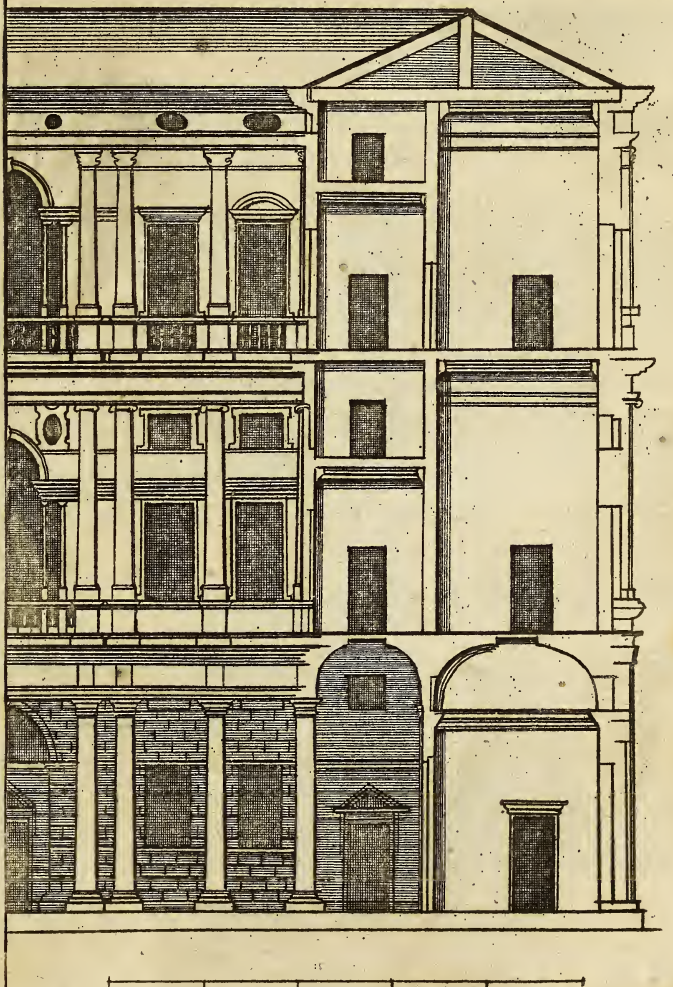
ye Ground platt of my Lord Strozzi house Standing att Florence



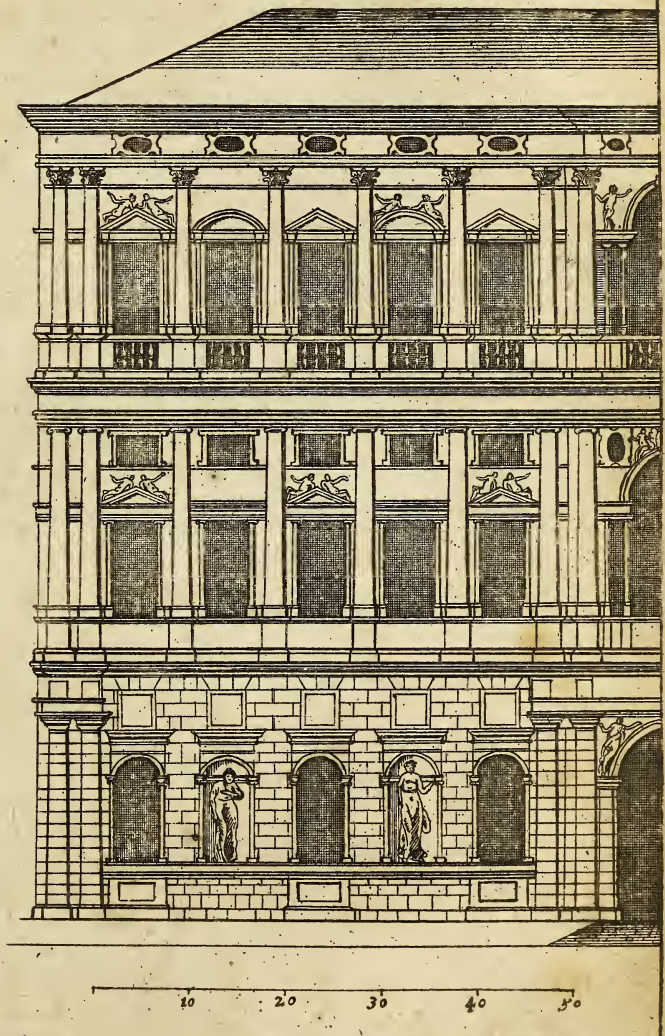




The Inside of my Lord Strozzi house standing all Florence

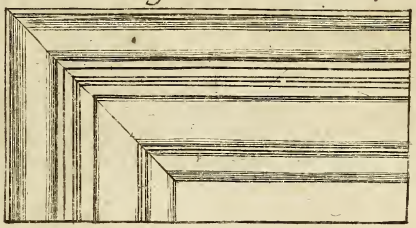


The front of my Lord Strozzi house standing att Florence



The Underside of ye Cornish

Toscana



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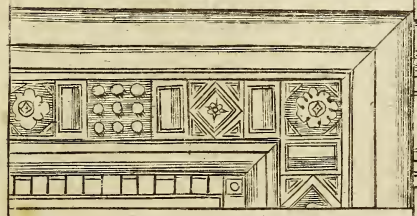
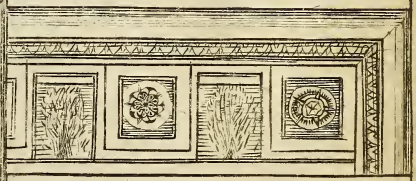
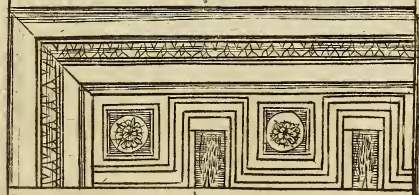


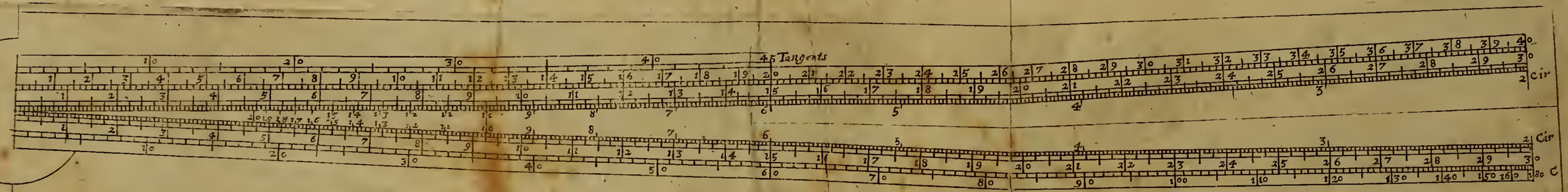
Ionica



Romana



Corintia



Folio 17

The Deſcription and Uſe of an Ordinary Joynt-Rule fitted with Lines for the ready finding the Lengths and Angles of Rafters and Hips, and Collar-Beams in any Square or Bevelling Roofs at any Pitch, and the ready Drawing the Architrave, Frize and Corniſh in any Order. With other uſeful Concluſions by the ſaid Rule.

By *JOHN BROWN.*

FIrſt, The Rule is an ordinary Jointed-Rule of a Foot long when ſhut together, or two Foot being opened to a ſtraight Line. And the Lines delienated thereon for this purpoſe.

1. A Line of Lines, drawn Sector-wiſe from a Center on both legs of the Rule, but continued at 30 in the end inſtead of 10 the old uſual manner, and every ſingle Integer of the 30 is divided into 12 parts, to repreſent every particular Inch of the 30 Foot, according to the common reckoning by Feet and Inches.

2. There is another Scale of equal parts alſo, of the ſame length lying as near to the other of 30 as may be, on one leg only, which is divided into 40 parts, to repreſent 40 Feet, each of thoſe 40 Feet, parted into 6 parts to repreſent every two Inches only, becauſe the room for one Foot, will not admit of more parts.

3. In the ſame place on the other leg is divided a Line of natural Sines and Tangents to 45, but numbered as a Line of Chords to 180 Degrees, to ſet the Rule to, or to find the quantity of any Angle, in the proper terms of Expreſſion (all the World over) degrees and minutes.

4. On the innermoſt Line of the 30 Scale that runs to the Center, is ſet twenty pricks, beginning at 2 at the Center-pin at 30, and ſo pro-

ceeding with 3, 4, 5, and 6 at the Center-pin at 15, and then 7, 8, 9, 10, and ſo forwards to 20, towards the Center, which ſerves to divide a Circle into any number of parts, very uſeful and ready in the practice of Drawing or Architecture.

Thus much for Deſcription, the Uſes follow.

The uſes of this Line of Lines, or Scale of equal parts to 30, drawn from the Center is of a general and manifold uſe; as *Gunter* in his Book of his *Sector* hath ſhewed.

A brief touch whereof take in the firſt place, as by the way, and then the uſe of the Rules to the buſineſs intended.

And for the better doing hereof, it is needful to explain three or four Terms, for the avoiding of many words, and needleſs repetitions in this brief, and yet plain Diſcourſe.

1. By the word Lateral is meant any diſtance taken, either in feet and inches, on the 30 Scale; or degrees and minutes on the Chords, taken and counted from the Center, in the midſt of the head of the Joynt-Rule, along any one leg; As thus, ſuppoſe I would take out 15 foot Laterally, ſet one point of the Compaſſes in the Center at the head, and open the other to 15 on any one leg on the 30 Scale; this extent I call a Lateral extent of 15 foot. Alſo if you take the Lateral Chord of 60 degrees, you ſhall find the extent of the Compaſſes from the Center to 60 to be the ſame as from the Center to 15 foot, on the 30 Scale of feet and inches.

2. By a word Parallel, I mean any diſtance taken, by ſetting one point of the Compaſſes in any number of feet and inches on one leg, and the other point in the ſame, or any other number on the other leg, acroſs from one leg to the other; as thus the Rule being opened, then the extent of the Compaſſes from 20 on one leg, to 20 on the other leg, is a Parallel extent.

3. In all Parallel extents, you muſt ſet one point of the Compaſſes in the common Line on one leg, to the common Line on the other leg, which common Line is that only on the 30 Scale which runs to the Center, in which the Center-pins at 15 and 30 are.

4. The neareſt diſtance from a point to a Line is only thus: Set one point of the Compaſſes in the point given, and open or ſhut the other being turned about, till the other will but juſt touch or cleave the Line, that I call the neareſt diſtance.

Uſe I. *To lay down a Line, that ſhall repreſent any Number of Feet and Inches given or required.*

Take the number given laterally from the 30, or 40 Scale from the Center, and that is the Line required. But

But if theſe Scales are too great, or too ſmall, then take your Number of parts, and the length thereof laterally.

As for *Example*; Suppoſe I would have 3 inches to repreſent 30 foot, take out 3 inches between your Compaſſes, and make it a parallel in 30 and 30, and the thirty Scale is ſet to your deſire.

Uſe II. *To increaſe or diminiſh a Line to any Proportion.*

Take the given Line between the Compaſſes, and make it a Parallel in the parts thereof; then the Parallel extent of the parts you would have it increaſed or diminiſhed to, is the Augmentation, or Diminution, which was required.

Example. Let 3 inches repreſent 8 foot, and to the ſame proportion I would have 10 foot or 5 foot, *viz.* more, or leſs.

Take 3 inches between your Compaſſes, and make it a parallel in 8, and 8 on the 30 Scale; then the parallel diſtance between 5 and 5, doth diminiſh the Line, and the parallel between 10 and 10 doth increaſe the Line to the proportion required.

Uſe III. *To divide a Line into any Number of Parts or Models under* 30.

Take the given Line, and make it a parallel in the parts on the 30 Scale into which you would have it divided, then the parallel extent between 1 and 1 ſhall divide the Line accordingly.

Example. Let 4 Inches be a Line to be divided in 9 parts, take 4 inches (or any diſtance whatſoever) and make it parallel in 9 and 9 on the 30 Scale; then the parallel diſtance between 1 and 1 ſhall divide 4 inches into 9 parts required: Note, That for more exactneſs and conveniency, you may double 9, or triple 9, *viz.* 18, or 27, and then if you make the Line to be divided, a parallel in triple the number you muſt take out 3 inſtead of 1, and that ſhall divide the Line into the parts required.

Example. I would have 5 inches put into 10 parts, take 5 inches between your Comaſſes and make it a parallel in 30, and thirty the triple of 10, then take out parallel 3, and 3 the triple of one; and that ſhall divide the Line given being 5 inches, into 10 parts or Models exactly; the like for any other. And note, as the Rule ſtands you may take out any Number of parts or Models whatſoever to that Scale.

Uſe IV. *Any two Lines given, to find the Proportion one to another, according to any Number.*

Take the Lines ſeverally, and lay them laterally from the Center, on the 30 or 40 Scale, which you pleaſe, and the numbers of feet and

inches, to which they reach, shall shew their proportion one to another of the parts of the Line on which they are measured.

Example. I have 2 Lines, suppose one is 2 inches long, and the other 5, or any other unknown part.

Take 2 inches the measure of one Line, and measure it laterally on the 30 Scale, and it gives 5 foot and $\frac{1}{2}$ an inch, then take out 5 inches the supposed length of the other Line, and it gives laterally 12 foot 8 inches; then I say one Line is 5 foot and $\frac{1}{2}$ an inch, and the other is 12 foot 8 inches of a Scale of 30 foot in 11 inches $3\frac{1}{4}$ length.

Or if you conclude on the Term or number of one Line, then make that Line, a parallel in the parts thereof, then take the other Line and carry it parallelly 'till it stay in like parts, on both legs in the common Line, and that shall be the Denomination of the other Line.

Use V. *Two Lines being given to find a third in continual Proportion to them.*

Take both the Lines, and lay them laterally on both legs, and note the feet and inches to which they do extend as in the last.

Then take out the lateral extent of the second Line, and make a parallel in the terms of the first Line, keeping the common Line at that opening, then the parallel extent from the terms of the second Line, shall be the lateral third term or Line in Proportion.

Example. Suppose I have one Line 3 foot long, and another 5 foot, and I would have another to bear proportion to 5, as 3 doth to 5 Increasing, being in numbers thus; as 3 is to 5, so is five to what? Here note that 3 is the first Number, and 5 the second.

The first Line laid from the Center on the 30 Scale, extends to 7 foot 7 inches, and 5 inches, the second Line gives 12 foot 8 inches.

Now the lateral second Line, *viz*, 5, or 12 foot 8 inches, made a parallel in 7 foot 7 inches the terms of the first Line, then take out the parallel extent from 12 foot 8 inches (the measure of 5) and it shall give 21 foot 1 inch laid laterally from the Center, for a third proportinal required; which measure on the inches, is 8 inches and a third, the answer required; for as 3 is in proportion to 5, so is 5 to 8 and a third part.

But by the Line of Numbers, having the quantity of the Lines given in numbers, do thus:

The extent of the Compasses from the first Number 3, to the second Number 5, shall reach the same way from the second number 5, to 8, 33 the third proportional Number required.

Use VI. *To divide a Line in such sort as another Line is divided.*

Take the whole Line that is divided, and lay it laterally on both legs,

legs, and fit the Line that is to be divided parallelly in the ends thereof, then lay every part of the divided Line laterally in like manner, as the whole Line was laid, and the parallel extent between those parts shall divide the Line accordingly: As for Example;

Suppose I would divide a Line of 8 inches $\frac{3}{4}$ long in such sort as the Line of Circles on the inside of the 30 Scale is divided.

Take out 8 inches $\frac{3}{4}$, and make it a parallel in 2 and 2, the divided Line, then take out the parallel distance from 3 and 3, and that shall give the point 3 from the end of the Line you would divide, and so consequently all the rest in order; as far as you please.

Use VII. *To find a Mean Proportional between two Lines or Numbers.*

Open the 30 Scale to a right Angle, by making lateral 21 foot 2 inches a parallel in 15 foot.

Then find the Sum and half Sum, the Difference and half Difference, between your two Numbers; and having the half Sum between your Compasses, set one point to the half difference counted laterally on one leg; and whereso'ever the other point shall touch the common Line on the other leg, is the mean Proportional required.

Example. Suppose a piece of Timber be 10 inches one way, and 18 inches another, what is the Square equal, which is the mean Proportional between them? The sum of 10 and 18 is 28, the half sum is 14, the difference between 10 and 18 is 8, the half difference is 4. Now the 30 Scale standing square, taking 14 the half sum between your Compasses, and then set one point in 4 on the leg; and turn the other point of the Compasses towards the common Line, and there it shall shew 13 $\frac{5}{10}$ near the square equal required.

Use VIII. *To work the Rule of Three by the Line of Lines to* 30, *or to* 3 *Numbers given, to find a fourth, in Geometrical Proportion direct.*

Make the lateral second, a parallel in the first, then the parallel third shall give the lateral fourth Number required.

Example. If one foot of Timber cost 10 *d.* what shall 6 foot cost? *Facit* 60 *d.*

Make lateral 10 a parallel in 10 counted as 1, then the parallel extent between 6 and 6 shall reach to lateral 60, the answer required (in pence.) Again another Example:

If 50 foot, or a load of Timber cost 44 *s.* what shall one foot cost?

Take the lateral extent from 22 the half of 44 *s.* and make it a parallel in 25 the half of 50, then the parallel distance between 2 and 2 counted

counted as 4 foot, shall give the lateral Number of 3 *s.* 6 *d.* the price of 4 foot, whose 4th part is 10 *d.* $\frac{1}{2}$ the price of one foot. Note, This help is used, to avoid the nearness to the Center where the work is inconvenient.

Use IX. *To measure Flat Measure by the Scale of* 30.

At any inches broad to find how much in length makes a foot.

Take lateral 12, make it a parallel in the breadth given, then take out parallel 12 again, and it shall give a length of the foot required.

Example. At 9 inches broad, a lateral 12, to parallel 9, so is parallel 12, to lateral 16, the length required.

Use X. *The breadth of a Board given in Inches, and the length in Feet, to find the content in Feet and Inches required.*

Take the lateral length in feet, and make it a parallel in 10, then the lateral distance between the inches broad, shall give the parallel Content. *Example.* Of 15 foot 3 inches long, and 9 inches broad.

Take lateral 15 foot 3 inches, and make it a parallel in 12, then take out parallel 9 and 9, and it shall give lateral 12 foot and a half, the Content.

Use XI. *To measure Timber by the Line of Lines to* 30.

At any inches square to find how much makes a foot of Timber.

If the Piece be not square, then by the 8th Use make it square: Then thus: Take the lateral Side of the Square in inches, make it a parallel in 12, then take out the parallel Side of the Square, and it shall give a lateral 4th Number.

Then take out lateral 12, and make it a parallel in the 4th Number, and then take out parallel 12 again, and it shall shew the answer in inches laid laterally from the Center.

Example. At 9 inches square what makes a foot?

As lat. 9 to par. 12, so is par. 9 to lat. $6\frac{3}{4}$: Again,

As lat. 12 to par. 4, *viz.* $6\frac{3}{4}$, so is par. 12 to 21 inches $\frac{1}{4}$ the length to make one foot required.

Use XII. *The Inches square, and length given in Feet, to find the Content in Feet and Inches.*

As the lat. Side of the Square, to parallel 12, so is the par. length to a lat. 4th: Again,

As the lat. 4th to parallel 12, so is the par. side of the Square, to lateral Content.

Example

Example. At 9 inches ſquare and 20 foot long.

As lat. 9 to par. 12, ſo is par. 20 to lateral 15, a fourth Number: Again,

As lat. 15 the 4th, to par. 12: So is parallel 9 to lat. 11 $\frac{1}{4}$, the Content required.

Thus much for the general Uſe, being too long a Digreſſion from the matter mainly intended.

Uſe XIII. *The breadth of any Frame being given, to find the length of the Rafter and Perpendicular by Inſpection only.*

It being a general received Rule, that the length of the Rafters ſhould be three quarters the breadth of the Houſe (or Frame) for true pitch, and 40 the feet in one Scale, being equal in length to 30 the Number of feet in another Scale, and 30 being $\frac{3}{4}$ of 40. Therefore, If you ſeek for the breadth of the Houſe on the 40 Scale, then right againſt it, on the 30 Scale, is the length of the Rafter required. Alſo if you ſeek the length of the Rafter on the 40 Scale, on the 30 Scale right againſt it, is the heighth of the Perpendicular required, *viz.* from the Raiſing piece to the top of the Gable end or Rafter required.

Example. If a Houſe be 30 foot broad, the Rafter ought to be 22 foot 6 inches, and the Perpendicular 16 foot 9 inches and $\frac{1}{2}$, for right againſt 30, counted on the 40 Scale, on the 30 Scale is 22·6 the Rafter, and right again 22·6 on the 40 Scale on the 30 is 16·9 $\frac{1}{2}$, the Perpendicular.

1. Alſo by the Line of Numbers, the extent of the Compaſſes, from 20 to 15, will reach the ſame way from the breadth of any Houſe to his proportinable Rafter at true pitch.

2. And the extent from 20 to 18, turned the ſame way from any breadth of a Houſe to his proportinable Hip Rafter, in ſquare Frames.

3. Alſo the extent from 20 to 11 $\frac{18}{100}$ will reach the ſame way from the width of any Houſe to his proportinable Perpendicular, at ſquare and true pitch.

4. And the extent from 23 to 28·28, will reach from any other Houſe breadth to his proportinal whole Diagonal Line required, at ſquare and true pitch.

5. And the extent from 20 the breadth to 16·63 the neareſt diſtance at that breadth, ſhall reach from any other breadth to his proportinal neareſt diſtance required, if it were needful. But the Angles in all Roofs great or ſmall, if true pitch and ſquare, is the ſame in all Frames.

Uſe

Use XIV. *The breadth of the House, and the height of the Perpendicular being given to find the Rafters length, the Hips length, the Diagonal Line, from Corner to the King post, and any Angle required, in square Frames. What the Perpendicular height of the Gable end ought to be at true pitch by the last Rule you may readily see, and the better make estimate of the quantity of alteration. Which being once resolved on, then thus proceed.*

First open the two 30 Scales to a right Angle, by making lateral 21 foot 2 inches ½ a parallel in 15, and 15 in the Brass Center-pins.

1. Then count half the breadth of the House on one leg, and the length of the Perpendicular resolved on, on the other leg, then the parallel distance between them, measured laterally from the Center, shall give the true length of the Rafter required.

2. For the Hips length count the length of the Rafter last found on one leg, and the half breadth of the House on the other leg, and take the parallel distance between, and measure it from the Center laterally, and it shall be the true length of the Hips required.

3. For the Diagonal Line, count the half breadth of the House on both legs, and take the parallel distance between, and measure it from the Center, and it shall be the length of the Diagonal Line, from the Corner to the King-post.

4. Again, for the Hips count the Diagonal Line last found on one leg, and the Perpendicular height on the other leg, and the parallel distance between shall be the Hips true length measured as before from the Center.

Example. In a House of 20 foot wide at true pitch. See *Fig.* 1. Let A B C D represent a Frame of a House 20 foot wide, B I the half width, B A and C D, equal to B C, the whole width being 2 points to draw the Diagonal Line by. I E being equal to I B, and the half E I laid from E to G, gives I G the length of the Rafters, and G B or G C the length of the Hips.

Or thus, Three quarters of C B, *viz.* C H, gives C F and B F, the Rafters length: The same extent also laid upon the middle Line from I to G, gives C G and B G the Hips length. I F is the Perpendicular height, E is the point of the Diagonal Line or King-post, perpendicularly opposite to, or right under the meeting point of the 2 Hips, and the 2 Rafters, when raised and set in their places.

Thus much for Illustration what to do, now for Application how to do.

The width of the House is always given, the length of the Rafter; or

or the heighth of the Perpendicular is next resolved on, which in our Example being true pitch also resolved on, either by inspection, as before, or else by Operation in this manner.

1. The breadth of the House being 20 Foot, and the Perpendicular resolved on to be 11 foot 2 inches $\frac{1}{2}$ to find the Rafters length, work thus: Open the 30 Scale to right Angle (by use the 7th) count 10 the half breadth of the House on one leg; and the Perpendicular height 11 $2\frac{1}{2}$ on the other leg, (*viz.* both on the 30 Scale from the Center) and take the parallel distance between them (on the common Line) and measure it from the Center, and it shall give just 15 foot, the length of the Rafter required C F.

2. But if according to the width of any Frame, you resolve on the Rafters lenghth, and would have the perpendicular height of the Gable end; then thus: Count the length of the Rafter from the Center, and take the lateral point thereof (being 15) between your Compasses, the Compasses being so set, set one Point in 10, the half width of the Frame, and turn the other point parallelly to the common Line, and there it shall shew 11 foot $2\frac{1}{2}$ inches, the true height of the Perpendicular at true pitch required, I F 11 foot 2 inches $\frac{1}{2}$.

3. For the length of the Hips count the half breadth of the House on one leg, and the Rafters length on the other leg, and take the parallel distance between, and it shall give the true length of the Hips required. As here, the parallel distance between 15 and 10, shall be lateral 18, the true length of the Hips required in a square Frame 20 foot wide true pitch. C. G.

4. For the Diagonal Line from the corner to the King-Post. Count the half width of the House, *viz.* 10 foot on both legs, and take the parallel extent between, and it shall reach from the Center to 14 foot 1 inch $\frac{5}{8}$ being the Line C E in the Figure.

5. Otherwise for the Hips length, count the half Diagonal on one leg, 14 1 $\frac{5}{8}$ and the Perpendicular 11 foot 2 inches, 2 $\frac{5}{8}$ on the other leg, and the parallel distance between measured from the Center, will give the true Hips length 18, *viz.* the Line C G.

Thus much for the Rafters and Hips in square Frames at true pitch, the measure of whose Angles and lengths are as followeth.

The breadth of the House being 20 *foot, and the two ends square, and the Rafters at true pitch, the Lengths and Angles of the Frames are*

	F. Inc.	100*p.*	*F.*	100 *p.*
C F Rafter	15	00	15	000
C G Hip.	18	00	18	000
I F Perpendicular	11	02	11	180
B E ½ Diagonal	14	01	14	140
B I Half Breadth	10	00	10	000
B C Whole Breadth	20	00	20	000
K G Neareſt Diſt.	16	07	16	624
B D Whole Diag.	28	03	28	281

		d.	*m.*
Rafter	Top	41	50
	Foot	48	10
Hips	Top	51	38
	Foot	38	22
Difference		13	16
Outſide Ang.		116	12

The Rule to find the Angles of the Rafters and Hips.

1. For the Angles that the Rafters make at foot, and head, with the Raiſing-piece and the King-poſt, do thus; When the Rule ſtands ſquare in the 30 Scale, then lay any ſtrait piece to the Compaſs points, when one ſtands in the half breadth, and the other point in the Perpendicular; then if you apply a Bevel ſeverally, to that ſtrait edge, and the 30 Scale at each end, the one is the Angle at foot 48-10, and the other the Angle at head, *viz.* 41-50.

2. For the Angle at head or King-poſt and foot of the Hips, do thus, the 30 Scale being ſet ſquare, ſet one point of the Compaſſes in the half Diagonal Line; on one 30 Scale, and the other point in the Perpendicular on the other 30 Scale, and to thoſe poinrs lay any ſtrait piece, then ſet a Bevel to that ſtrait piece, and each 30 Scale, and the one ſhall be the Angle at foot 38-22, and the other the Angle at the head, *viz.* 51-38; then this laſt Angle doubled, and difference between the Angle at head and foot, *viz.* 13-16 added, makes 116-12 the Angle of the out-ſide of the Hip-ſide in a ſquare Frame at true pitch required.

3. A general way to find this outward Angle of the Hip or Mould is thus, in any pitch.

Firſt, You muſt find the neareſt diſtance from one corner to the oppoſite Hip ſet up, or from a point in the raiſing piece, as far from one corner as the Houſe end is broad, as the point K or L in the Figure may be done thus. Count the length of the Hip on one leg, (and alſo take it between your Compaſſes) and count the Breadth of the Houſe on the other leg, and ſet one point of the Compaſſes in the Hips length on one leg, and the other point in the breadth of the Houſe on the other leg altering the 30 Scales, but not your Compaſſes; then when the

the 30 Scales are ſo ſet, one repreſents the Raiſing-Piece, and the other the Hip ſet up.

Then the neareſt diſtance from the breadth of the Houſe on one 30 Scale, to the common Line on the other 30 Scale, is the neareſt diſtance requir'd, being meaſur'd from the Center 16-7 $\frac{1}{2}$.

Then take the whole Diagonal Line, *viz.* C L, or B K from the Center laterally, and make it a parallel in the neareſt diſtance laſt found: And that ſhall ſet the 30 Scales to the Angle of the out-ſide of the Hip requir'd, which you may meaſure in degrees thus: Take parallel 15 as the Rule ſtands, and lay it from the Center and it ſhall reach to 116 degrees on the Chords, next one 30 Scale, the Angle of the out-ſide of the Hips requir'd.

Example, and more briefly in a Houſe 20 Foot broad

The Houſe end is 20 foot broad, the whole Diagonal Line is 28 foot 3 inches $\frac{3}{8}$, the Hip-Rafter 18 foot.

Take 18 foot between your Compaſſes, and ſet one point in 20, and open or ſhut the Rule 'till the other fits 18, then the neareſt diſtance from 20 to the common Line, will be 16 foot 7 inches $\frac{4}{8}$.

Then take 28 foot 3 inches $\frac{3}{8}$, the whole Diagonal Line, and make it a parallel in 16 foot 7 inches; $\frac{1}{2}$ the neareſt diſtance, and the 30 Scales are Set to the Angles requir'd: For,

If you take out parallel 15 the Chord of 60, and meaſure it laterally from the Center, it ſhall reach to 116, the Angle in degrees and minutes requir'd.

Note, if the whole breadth and whole Diagonal Line is too large for your Compaſſes, then the half breadth and half Diagonal will do as well, (taking the half length of the Hip alſo between your Compaſſes, and on the Scale alſo) and that ſhall ſet the Scales to the ſame Angle as before.

Uſe XV. *To find the Lengths and Angles of the Rafters and Hips, or Sleepers, in Bevilling Frames at any Pitch.*

1. For the length of the Rafter, ſet the 30 Scales ſquare, than count the half length of the Bevel end on one leg, being always more then the half breadth) and the Perpendicular reſolv'd on, on the other leg; Then the parallel diſtance between, meaſur'd laterally, ſhall be the length of the Rafter requir'd, and a Ruler laid to the two points of the Compaſſes ſo ſet on the 30 Scales, and a Bevel ſet, as before in ſquare Frames is ſhew'd, ſhall give the Angles at head and foot requir'd.

2. For the Hips length, count the Rafters length on one leg, and

the half breadth of the Bevel end of the Houſe, more by half the number of inches bevelling on the other leg, and take the parallel diſtance between and meaſure it laterally from the Center, and it ſhall be the length of the longeſt Hip-Rafter. And for the ſhorteſt Hip count leſs for the Bevel end, by half the number of inches bevelling, and that ſhall be the ſhort Hip requir'd.

3. The inches, or feet and inches of bevelling being given, to find how much one corner is under, and the other over 90 degrees (or juſt ſquare) open the 30 Scales, and take the breadth of the Houſe over at the neareſt diſtance, between your Compaſſes, from the 30 Scale from the Center laterally, and make is a parallel in 15 and 15 for 60 of the Chords.

Then take the feet and inches bevelling from the ſame 30 Scale laterally, and carry it parallelly 'till it ſtay in like parts; then juſt againſt it on the degrees or Tangentes are the degrees and minutes requir'd that one corner is more, and the other leſs than 90 degrees.

4. *To find the Diagonal Line.*

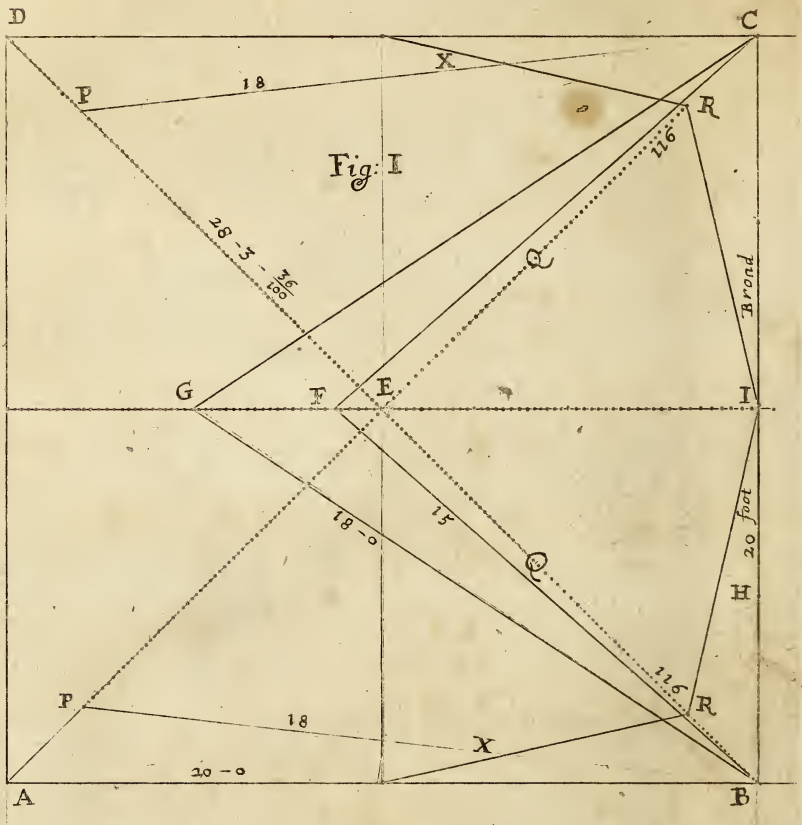
Take the diſtance in the Chords to the degrees above, or under 90 laſt found; from the Center laterally, and make it parallel a in 15 and 15, and then the 30 Scales are ſet to the Angle; the end is over, or under 90 degrees: Then count the whole or half Bevel end on both legs, and the parallel diſtance between ſhall ſhew the length of the whole, or half Diagonal Line meaſur'd from the Center.

Note, That when the Rule ſtands at the Blunt Angle, it gives the longeſt Diagonal Line, and when it ſtands at the ſharp Angle, it gives the ſhorteſt Diagonal Line.

5. *By the Diagonal Line and Perpendicular to find the Hips length, and the Angles at Head and Foot of the Hip or Sleeper.*

Count the half Diagonal on one leg, and the Perpendicular height on the other leg (the 30 Scales being ſquare) then the parallel diſtance between, ſhall be the length of the Hip requir'd, being longer or ſhorter, as the Diagonal Line is.

Alſo a Rule laid to the two points of the Compaſſes meaſuring the parallel extetn, and a Bevel laid to the Rule, and the two 30 Scales at each end, gives the Angles at head and foot of Hips requir'd.


D
C
X
P
18
R
Fig: I
11.6
28-3 - 16/100
Q
Brond
G
F
E
I
18-0
15
Q
20 foot
H
11.6
R
P
18
X
20-0
A
B

To find the neareſt diſtance from the Corner of the Rombus to the oppoſit Hip ſet up in his true place.

6. Count the length of the Hip on one 30 Scale, and take that diſtance alſo between your Compaſſes laterally, count alſo on the other 30 Scale the length of the Bevel end, and there ſet one point of the Compaſſes, and open or ſhut the Rule, 'till the other point falls in the length of the Hip-Rafter firſt counted, (then one 30 Scale repreſents the Raiſing Piece, and the other ſet up) then the neareſt diſtance from the breadth of the Frame over, at the Bevel end and more, or leſs, by half the feet and inches Bevelling, to the common Line of the other 30 Scale, being meaſur'd from the Center ſhall be the neareſt diſtance requir'd.

To find the Angle on the Outſide of the Hip.

7. To find the Outſide Angle of the longeſt Hip, take the ſhorteſt Diagonal Line between your Compaſſes, and make it a parallel in the neareſt diſtance belonging to that Hip, and the 30 Scales will be ſet to the Angle requir'd, and to meaſure it take Parallel 15 and 15, and meaſure it laterally from the Center in the Chords; and you ſhall have the meaſure of the Angle requir'd

Examp. In a Houſe of 20 foot over at neareſt diſtance, and 4 foot or 48 inches Bevelling out of ſquare. See Fig. II.

Let A B C D repreſent a Frame 20 foot over, and 4 foot Bevelling the Bevel-end B C is longer than right over by 5 inches; for if you ſet the Rule ſquare, and take the parallel extent from 20 the meaſure over, to 4 foot the meaſure of Bevelling, and meaſure it laterally, you ſhall find it reach laterally to 20 foot and 5 inches, the true length of the Bevel-end.

The Bevel end being 20. 5. inches the Perpendicular reſolv'd on which at true pitch ought to be about 11 foot 5 inches, *Fere.* Then firſt for the Rafters length.

1. Set the 30 Scales ſquare, and ſet one point in 11. 5. the Perpendicular, and the other point in 10 foot 2 $\frac{1}{2}$ the half Bevel end; (and to the Compaſs points, lay a Rule, and to the Rule and the 30 Scales at both ends ſet a Bevel, and one ſhall be the Angle at foot the other the Angle at the top of the Rafter; and the one Angle will be 42 degrees for the foot, and the other 48 for the top of the Rafters) and the meaſure between the Compaſſes meaſur'd from the Center ſhall be 15 foot 4 inches, the Rafters length requir'd.

As

As by Inspection on the 40 and 20 Scales you may see.

2. For the longest Hip set one point 12 foot 2 inches and $\frac{1}{2}$ more by 2 foot, then 10 foot 2 inches $\frac{1}{2}$ the half Bevel end, and the other point in 15. 4 the Rafters length, and measure it from the Center, it gives 19 foot 6 inches the longest Hip.

Again, Set one point in 8 foot 2 inches $\frac{1}{2}$ 2 foot shorter than the half Bevel end, by 2 foot the half of 4 foot the Bevelling, and the other point in 15 foot the Rafters length, and measure it from the Center, it gives 17 foot 4 inches the length of the shortest Hip.

3. For the length of both Diagonal Lines, set the Scales of 30 to the Angle of the Frame at each corner, and the measure from the half, or the whole Bevel end taken parallelly, shall be the length requir'd of the half or whole Diagonal Line, according as you take the whole or half Bevel-end.

As here in our Example the Blunt end is 101 gr. 30 min. or 11 30 more than 90 gr. therefore take the distance from the Center to 101, 30 on the Chords and make it a parallel in (15 and 15) the Chord of 60, then is the 30 Scales set to the Angle of the Blunt end of the Frame and the parallel distance between 20-5 the whole Bevel end gives 31 foot 6 inches, the whole Diagonal Line B L, or the parallel between 10-2 $\frac{1}{2}$ give 15 90 inches B E the half.

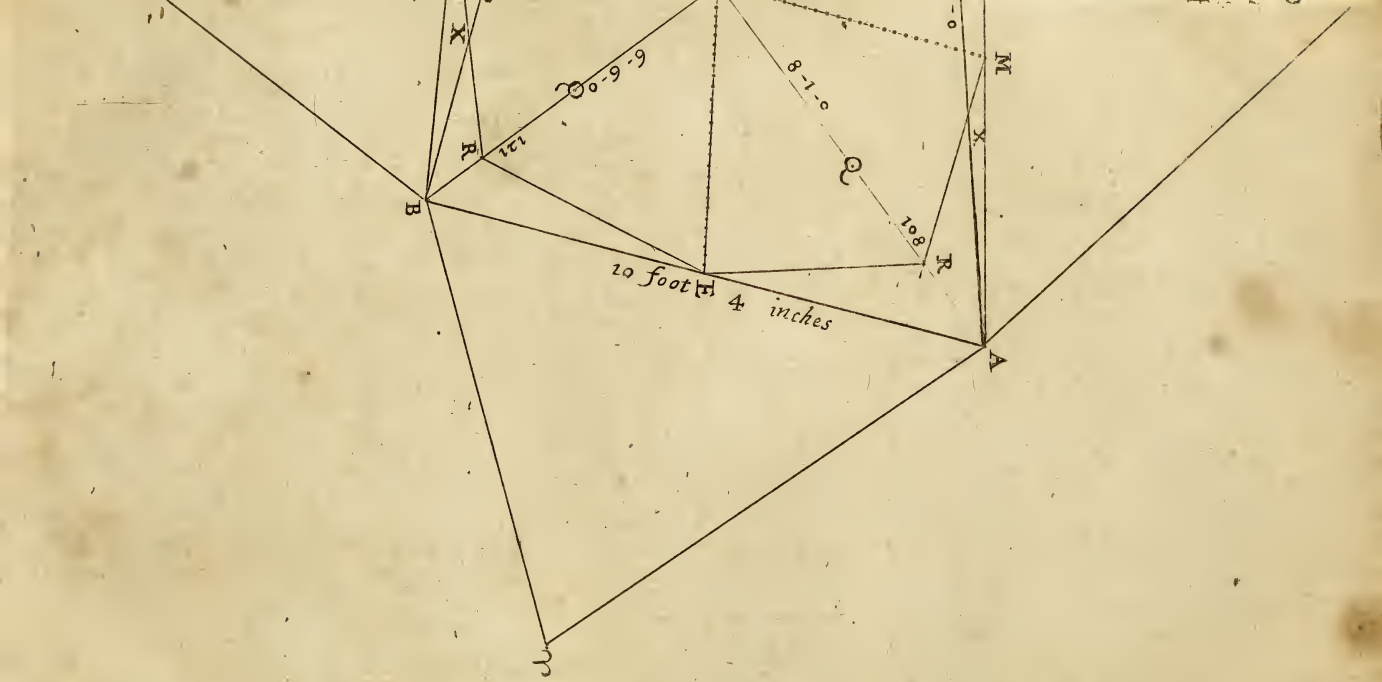
Again, the sharp end is 78. 30 11 deg. 30 less than 90, then the lateral Chord of 78. 30. made a parallel Chord of 60 (at 15:) then is the Rule set to the sharp end of the Frame, for the shorter Diagonal Line, and the parallel distance between 10-2 $\frac{1}{2}$ gives 12 foot 11 the half, or 25 foot 10 inches the whole Diagonal Line C F, whose half is C E the shortest, whole, and half Diagonal Lines.

4. For the Hips length, and Angles at foot and head.

Set the 30 Scales square, and count the shortest half Diagonal 12 foot 11 on one leg, and the Perpendicular 11 foot 5 on the other leg, then the Compass point to set, lay a Rule and take the Bevel at both ends, and it shall give the two Angles at head and foot of the shortest Hip, and the same distance of the Compass points shall be 17 foot 4 inches *fere*, the Hip length, as before and the Angle at the top 48. 30 and at foot 41. 30 is his Complement.

Again set one point in 15 foot 10 the longest half Diagonal, and the other point in 11 foot 5 inches the Perpendicular, and lay a Rule to them, and set the Bevel to both ends, and you shall find 54 gr. the Angle at the top, and 36 the Angle at foot, and the distance between the Compasses laid from the Center, gives 19 foot 6 inches the longest Hip.

5. For


B
A
M
X
R
121
6-6-0
8-1-0
108
20 foot 4 inches

5. For the Outside Angles of both Hips, the longest first.

Take 19. 6 between your Compasses, the Hips length from the 30 Scale: Set one point in 20 foot 5 the Bevel end, and close the Rule 'till the other point touches 19 foot 6 the Hips length.

Then take the neareſt distance from 18 foot 5 (2 foot less then 20 foot 5 the breadth of the Bevel end of the Frame) to the other 30 Scale, and it is the neareſt distance from the point of the *Rombus* A to the Hip B G set up, 16 foot 9 inches.

Then take out 25 foot 10 the shorteſt Diagonal, and make it a Parallel in 15. 9 the neareſt distance, and then the 30 Scales are set to the Angles required; for the Outside of the long Hip, being 110 deg. for Parallel 15 measured laterally on the Chord, gives 110·00.

6. For the Outside Angle of the shorteſt Hip.

Take 17 foot 4 inches between your Compasses, and set one point in 20 foot 5 the Bevel end, and open or shut the Rule 'till the other point reaches 17. 4 on the other 30 Scale. Then the neareſt distance from 22 foot, 2 foot more than the breadth of the Bevel end of the Frame to the common Line on the other 30 Scale, and that shall be the neareſt distance from L to C G, the shorteſt Hip set up, which is 18 foot 9 inches.

Then take out 15 foot 10 inches the half greater Diagonal Line, (because 31 foot 8 inches is more than the Scale of 30) and make it a Parallel in 9. 00 the half of 18 foot, and the 30 Scales are set to the Angle required, *viz* 122 deg. for if you take out Parallel 15, and measure it in the Chords laterally, it shall be 122 the Angle required.

Note here by the way, the length of the Bevel end, and the two Diagonal Lines, and the halfs of them, and the blunt and sharp Angles of the Frame, are given by the draught of the Frame, and they being first known, the work is half done; but if not given, then use these Directions which will help you to see the reason of Plain Triangles, and the use of the Scales.

Use XVI. *To find the Rafters, Hips and Angles in Bevel and Taper Frames, being broader at one end than the other.* See Fig. III.

First, When the Frame is broader at one end than the other, then the middle breadth is to be the guide for the Rafters length, and the Perpendicular to be equal to the middle Rafters Perpendicular on both ends; though one pair of Rafters is longer than another, and the Roof is winding thereby: Which winding may many times be remedied by some convenient Artifice or other, as the Ingenious Workman will soon perceive. As thus in brief: Let

Let A B C D represent the Frame of a House Bevelling at both ends, and broader by 2 foot at one end than the other; as here in the Bevelling Figure, being 20 foot on one side, and 24 foot on the other side at one Bevel end 10 foot 4 inches, and at the other end 8 foot 1 inch $\frac{1}{2}$ but at the nearest distance over, only 10 foot, and 8 foot.

First, For your more apparent satisfaction, draw the true form of the Frame by as large a Scale as you conveniently can, with the Sides and Angles as exact as you can, as A B C D; then draw the middle Line E F quite through the length, and G H through the breadth of the Frame Perpendicular one to the other, then measure G H as suppose 9 foot, then lay off the half of G H from H to I and K, then take out $\frac{1}{4}$ of G H, and lay it from K and I to L 6 foot 9 inches for a pair of middling Rafters for this Taper House, L G being the common Perpendicular at the midddle and both ends of the Roof, 5 foot 0 inch. $\frac{5}{8}$ of an inch.

And for principal Rafters, or other Rafters open the 30 Scale square, and then count the Perpendicular 5 0 $\frac{5}{8}$ on one leg, and half the distance between the Rafter-feet or half breadth of the Frame at that place on the other leg, and the parallel distance between shall be the true length of the Rafter required.

Then for the Hips length, first, make A M and B M equal to A E or B E at one end, and make C N and D N equal to D F or C F, and draw the Lines M M and N N at both ends, also make A b and B b equal to A B, and C a and D a equal to C D, and draw the Diagonal Lines A S and B S, and C O and D O, and at each end extended, and set down the measures of them.

These Lines being drawn you have the half Diagonal Lines A S and B S, and C O and D O, and may measure them by your Scale, to find their lengths, or set the Rule to the Angles A E S and B E S, find them by the 30 Scale; also you have the Bevel ends of the Frame and the nearest distance over from side to side of the Frame.

Then for the Hips length and Angles thus.

Set the 30 Scales square, and count the Perpendicular height L G on one leg 5-0-$\frac{5}{8}$ and each half Diagonal Line, *&c.* one after another on the other leg, and the Parallel distance between shall be the true length of the several Hips required. *Example.*

The parallel distance between 5 foot-0-inches $\frac{5}{8}$ the common Perpendicular counted on one 30 Scale, and 8 foot 1 inch, the longest Diagonal Line A S counted on the other 30 Scale, shall give 9 foot 6 inches for the length of one Hip A P laterally. And

And the parallel distance between 5 - o - $\frac{5}{8}$ the common Perpendicular, and 6 foot 6 inches the other Diagonal Line B S, shall give the lateral measure of 8 foot 3 inches, the length of B P, the other Hip-Rafter for the broadest end of the Frame A B.

Again, the Parallel distance between 5 - o - $\frac{5}{8}$ the common Perpendicular, and 6 foot 4 inches the greater Diagonal Line C O at the narrowest end, shall give 8 foot 1 inch for the Hip-Rafter C P. And the Parallel distance between 5-o-$\frac{5}{8}$ and 5 the Perpendicular and 5 foot - o - inch - o the lesser Diagonal Line D O shall give 7 foot 2 inches for the Hips length D P to stand over the Diagonal Line D O.

Note also, That if to the Compass points, standing parallelly, you lay a Rule, and to the Rule so laid, and the 30 Scales at each end a Bevel, and set it according to the Rule and 30 Scales, it shall give the true Angle of the Hips at the Raising piece and King-post, which 8 Angles in these 4 Hips, are express'd by the Lines and Letters in the Scheme thus: P A S and P B S, P D O and P C O, the 4 Angles at the Raising-piece. And S P A and S P B O P C and O P D, the 4 Angles at the King-post.

Whose length you may prove by Mr. *Pope*'s excellent way, making S P and O P equal to L G on the extended Diagonal Line, and drawing the Lines A P, B P, C P, D P for the 4 Hip-Rafters length requir'd.

Or for more proof, thus also by the Rule, as before in square Roofs.

Set the 30 Scales square, and take the Parallel extent, from 7 foot 2 - $\frac{3}{4}$ the Rafters length at the broader end, and one 30 Scale, to 6 foot 2 inches more, then $\frac{1}{2}$ the Bevel end by one foot the half quantity of Bevelling, and it shall give 9 foot 6 inches for the Hip A P, and from 7 - 2 - $\frac{3}{4}$ to 4 - 2, one foot less than the half Bevel end, to 8 foot $\frac{3}{4}$ the Hip B P. Also the Par. extent from 6 foot 5 - $\frac{1}{2}$ the Rafters length at the lesser end, to 5 foot o $\frac{3}{4}$ one foot more than 4 - o - $\frac{3}{4}$ the half little Bevel end, shall give 8 - 1 - $\frac{1}{2}$ for the Hip P C. And the extent from 6 - 5 - $\frac{4}{8}$ the Rafters length, to 3 - o - $\frac{3}{4}$ 1 foot less than the half Bevel end, gives 7 - 1 - $\frac{1}{2}$ the Hip D P, as before.

Note, That by the working these 3 ways, you may be sure to prevent any mistakes that may happen in working one way only.

Lastly, For the Angles on the outside or backs of the Hips. Take every several Hips length laterally between your Compasses, and set one point in the length of the Bevel end, (or rather in a mean between A B the Bevel end, and M M at the greater end, or C D and N N at the lesser end) and open or shut the 30 Scales till the other point falls on the Hips length that you work for, then for the longer Hip count

more, and for the shorter Hip less, by half the Inches Bevelling, then the whole breadth over, at the end, and take the parallel neareſt distance from thence to the 30 Scale for a neareſt distance, which neareſt distance you muſt keep.

Then take the whole Diagonal Line Perpendicular to the Hip, wrought for (*viz.* the ſhorteſt Diagonal Line for the longeſt Hip at each end) between your Compaſſes, and make it a parallel in the neareſt distance laſt found, and then the 30 Scales are ſet to the Angle of the back of the Hip required.

Example in this Figure for the longeſt Hip.

Take 9 foot 6 inches, the Hips length A P between your Compaſſes, and ſet one point in 10 foot 1 inch (a mean between A B 10 foot 4, and M M 9 - 10 - $\frac{1}{2}$) and open or ſhut the Rule, 'till the other point ſtands in 9 foot 6, the Hips length firſt taken. Then the neareſt diſtance from 9 foot 4 inches, 1 foot leſs than 10 foot 4 inches, the Bevel end diſtance over, to the other 30 Scale ſhall give 7 - 10 a neareſt diſtance from the Point b to A P the Hip raiſed over A S the Diagonal.

Then the lateral extent B b of the whole Diagonal Line 12 foot 7 inches being made a Parallel in 7 - 10 the neareſt diſtance laſt found, ſhall ſet the 30 Scales to the Angle at R the back of the Hip required, meaſured by taking Parallel 30, and meaſuring it laterally on the Chords, it is about 108 degrees.

Secondly, Take 8 foot 4 inches, the other Hips length between your Compaſſes, and ſetting one point in 10 foot 1 inch as before, open or ſhut the Rule 'till the other point falls in 8. 4 the Hips length.

Then the neareſt diſtance from 11 foot 4 inches, 1 foot more than 10 foot 4 inches, the diſtance of the Bevel end to the common Line of the other 30 Scale, ſhall be when meaſured laterally from the Center 2 foot *fere*, for a neareſt diſtance.

Then 15 foot 8 inches the longer Diagonal Line being made a parallel in 9 foot *fere*, the neareſt diſtance laſt found, ſets the 30 Scales to 121 deg. the Angle required, the back of the ſhorter Hip required.

The ſame work ſerves for the other end, being near the ſame Angles: Which you may prove by Mr. *Will. Pope*'s excellent way thus: Find the middle between S and A, or S and B at Q, then the neareſt diſtance from Q to B P or A P near lay to R, and draw the Lines R E, R M for the Angles at R, the back of the Hips required.

Moreover, if you raiſe 4 Perpendiculars cutting the points O and S, the 2 places of the King-Poſts being Perpendicular to the Raiſing-Pieces

Pieces A C and B D, as the 4 Prick-lines ♉ S, ♏ S, ♌ O, and ♓ O do ſhew, and lay the length of each Hip from his proper corner A B C D as A P from A to ♈ and ♏. B P from B to ♈ and ♉, D P from D to ♓ and ♋, C P from C to ♌ and ♋, then draw Lines from point to point as in the Figure.

Then ♏ ♌ and ♉ ♓ are the two Ridges when turned right over O S, and C ♋ D is the leaſt Hip, and A ♈ B is the greater Hip, as Mr. *Pope* hath well ſhewed. Thus much for Hipt Roofs.

Uſe XVII. *To find the length and Angles of every Principal Particular Rafter in Frames, broader at one end than the other.*

The Perpendicular, as before was hinted, is to be the ſame all over the Roof. Therefore open the Rule ſquare, and take from the Perpendicular on one leg, to the half breadth of the Frame on the other leg, meaſure it from the Center, and that is the length required. For the Angles lay a Rule to the Compaſs points, and ſet a Bevel, as before is ſhewed, and you have the Angles at the Raiſing Piece, (and Ridge of the Houſe) to cut the Rafters feet by.

The ſame Rule ſerves to draw out a pair of Well-Stairs, to give Hypothenuſas, or Strings, at any particular heighth and breadth; for the 30 Scales ſet ſquare, and the Perpendicular heighth counted on one leg, and the breadth on the other leg, the meaſure between is always the Hypothenuſa, or String in flying Stairs, as may plainly appear.

Uſe XVIII. *To find the Length and Angles of Collar-Beams in any Roof.*

Take the whole breadth of the Frame between your Compaſſes, and ſet one point in the length of the Rafter on one leg, and the other point in the ſame place on the other leg: Then the two legs repreſent the two principal Rafters, and a Rule laid to the Compaſs points repreſents the Raiſing-piece; then at any heighth that you pleaſe above the Raiſing piece, apply a Rule parallel to it, and the meaſure between laid from the Center, gives the length, (remembring to add Wood for the Tenons) and a Bevel laid to the 30 Scale and Rule, gives the true Angle to cut it by, (where the Timbers be ſquare.)

Uſe XIX. *To find the Lengths and Angles of Rafters, and Purloyns in Bevel Frames.*

The length of the Rafters is ſhewed before, to find it by the half breadth of the Square or Bevel end, and the Perpendicular anſwerable to that Roof, as afterward in the Example.) And the Angle of the

Foot, and Outsides or Backs of the Bevel end Rafters, and the upright of the Gable end, must be to an Angle less and more than 90 deg. by the Angle at the Corner of the Frame where that Rafter is to stand, being more at the sharp Angle and less at the blunt Angle, as in Fig. IV. you may see; the true quantity of which Angle is thus found by the Rule.

Take the length of the Rafter for the Bevel end in feet and inches, and make it a parallel in 15, then half the quantity of feet and inches Bevelling, taken from the same Scale and carried parallelly 'till it stay in like parts, shall shew right against it in the Tangents the deg. and min. required.

And this is the Angle that the blunt Corner is to be laid in Legement more than a square, and the short Angle less than a square or 90 deg. both out of level, and out of square also, when you tumble or stripe in, the Tenons of the Purloyns, the thing desired.

Examp. Let A B represent the Bevel end of a Frame, being out of square from the Line A C 6 foot, as the Line C B sheweth, then if A C be 20 foot, A B will be 20 foot 10 inches. Then draw E L the middle Line of the Frame, and G M and H K, the Lines at three quarter of the breadth of the Frame, then take E D the half Bevel and lay it from G to F and from H to I, and draw the Lines A F and B I, for the outside Lines of the two bevel end Rafters; and the two other Lines parallel to them, according to the breadth or scantling of your Bevel end Rafters, as here in the Fig. 8 inches broad. Thus the Lines A F, and B I, represent the two end Rafters, laid in Legement to fit in the Purloyns, as for their lying out of square from the Raising-pieces. And to the same Angle they are to be laid out at Level, that the cutting of the Purloyns ends may fit the Rafter sides, when erected in their places, according as the ends F and I of the Bevel end Rafters are, according to the Angles A F G and A F M the one being 11 deg. and 20 min. under, and the other 11, 20 above 90 degrees.

Also Note, That if P K, and O M do represent a pair of square Rafters, at any intended distance from A, then T S and R Q will give the true length of the Purloyns fit for those places, R Q being the shortest Purloyn, and T S the longest Purloyn.

To find by the Rule only how long the Purloyn must be on the outside more or less than the distance on the Raising-pieces, where you intend the two square Rafters feet shall stand, do thus: Set the 30 Scales the same Angle that the Bevel end Rafters lie out of square, when they lie in Legement, to Frame which here is to 11 deg. and 20 min.

Then

Then count from the Center the quantity of feet and inches you intend to make the Mortiſe-holes from the Rafter Foot, in the Rafters, for the Tenons of your Purloyns; and take from thence to the neareſt diſtance to the other Line, and that ſhall ſhew the quantity that the one Purloyn is to be longer, and the other ſhorter, than the diſtance between the Rafters Feet on the Raiſing-pieces; Example thus:

Set the 30 Scales to the Angle G A F, then count A S the place for the Mortiſe hole from A on the Rafter, and take the neareſt diſtance from thence to the other 30 Scale that ſhall give S V, the quantity how much T S is ſhorter than A O, and how much R Q is longer than P B.

Note, That if you count three quarters of 20 foot 10 inches, being the length of the Bevel end, that then you will make the Rafters too long by 4 inches and a half, as in the Figure you may ſee: Therefore the ſureſt way to find the Rafters length is to ſet the Scales to a ſquare, and then to take the Parallel extent from the common Perpendicular, to the half breadth between the place for the Rafters Feet on the Raiſing-piece: So that the length of the Rafters for the Bevel end at true pitch, is A F 15 foot 3 inches, and not A W 15-7-½, which is juſt 3 quarters of A B the Bevel end over which the two Rafters are to ſtand. For then the top of the Bevel end Rafters would be too high for the top of the ſquare Rafters being cut juſt 15 foot, three quarters of 20 foot the breadth of the Frame.

Uſe XX. *The Uſe of the Scales to lay down or meaſure out on Paper, or Board, the Members and parts of the fine Columns, and their Ornaments, with their Names and Meaſures, digeſted into a Table, for the more eaſe and uſe of Workmen.*

For the drawing of the fine Columns and their Ornaments, is largely before treated of in the former Part, by Models, Minutes and Quarters, and conſidering the Harmony between it and our Scales to 30, that are parted into 12 parts, ſo that when every Figure or Foot on the Scales to 30 repreſent a Model, then every inch is 5 minutes, and for ſmall Paper draughts, that way of counting is near enough, but when you uſe it for a bigger draught, that the whole Scale of 30 may repreſent 3 Models only: Then every Figure will repreſent 6 minutes, and the 12 inches between are half minutes: But in every great Work, as in Temples or Caſtles, then the whole foot or Scale to 30 may repreſent half of one Model only, and then every Figure or Foot is a minute, and every inch or ſmall diviſion is the 12th part

of

of a minute; for I count it to be a large Column, whose Diameter at the base (which is a Model) is above 3 foot, and by this manner of computation which is natural to most Scales, the Scales to 30 may be rendred convenient for small, or moderate, or large uses, as in the following Examples may somewhat appear.

In reading of which you must have recourse to the former Figures, whose Members are marked with 1 2 3 4 5 6 7 8 9 10, and which Figures direct you to the Names in every of the Columns which I found to be wanting in the former part, so that the method here used is thus;

1. The first Column in the Table is 1 2 3 4 5 6 7 8 9 10 11 12, *&c.* answerable to the Figures on the 6th Figure, in our present Example, which will strait-way guide you to the meaning of the Names or Terms in the Table, by comparing it and the Figure together, whereby you may readily find every Part or Member and its proper Name.

2. The second Column is the Names of the Part or Member in the Gross and Particular also by the Pedestal, the Base, the Shaft, the Capital, the Architrave, Frize, and the Cornish, are the Names in Gross; the other are the Names of the Members in particular.

3. The third Column in the Table, is the several measures of the particular Members in Models, Minutes, and Quarters, as in the Figure, though more easily to be seen than in the Figures, because of the straitness of the room there.

4. The fourth Column in the Table, is the measure of every particular Part and Member, from the Pedestal Base or Bottom, to the Top of the Cornish, being useful in small Draughts where the whole Pillar is express.

5. The fifth Column in the Table, is the several measures of every particular Member of each Gross Part, being useful when you draw large Draughts of any Work or Part thereof.

6. The sixth Column in the Table, is the Measure of the Projecture of every particular Part, from the middle line of the Column (or from the smallest or most inward Part of the Pillar, the rest being subtracted) but I judge the middle line to be the best Epocha to begin the account of Projecture for the conveniency of the Compasses: And this Table of Projectures, as all the rest, is to Models, Minutes and Quarters; as by tryal you may see at one view what each Gross Part and every particular Part is.

The

The Names and Numbers of the Members of the *Tuscan Column* in Heighth and Projecture.

N.		A Table for the *Tuscan* Order	Each part from the Base. mo.	mi.	q.	Each grofs part alone M.	m.	q.	the proj. fr. middle. M.	m.	q.
1	Pedestal.	*The lower Faceo, or Plinth, of the Pedestal*	0	30	0	0 30 0			0 30 0	0 42	0
2		*The Pedestal Body, or Stilobatum*	1	0	0	1 30 0			1 30 0	0 40	0
3		*Abacus, the Casement, or hollow*	0	5	2	1 35 2			1 35 2	0 41	0
4		*Tinea, the List, or Square, or Rabit*	0	1	2	1 37 0			1 37 0	0 46	0
5		*The Architrave or Faceo*	0	12	0	1 49 0			1 49 0	0 47	0
6		*The upper List of the Pedestal*	0	3	2	1 52 2			1 52 0	0 49	1
7	Base.	*The Plint, of the Base of the Column*	0	18	0	2 10 2			0 18 0	0 42	0
8		*The Thorus, or Rondel, or Brest*	0	12	0	2 22 2			0 30 0	0 42	0
9		*The List, or Fillet, or Spira*	0	3	0	2 25 2			0 33 0	0 36	0
10	Shaft.	*The Shaft or Body of a Col.* at the Base	5	22	0	8 47 2			6 22 0	0 30	0
		at the Capit								0 22	2
11	Capital.	*The List*	0	1	2	8 49 0			0 1 2	0 24	0
12		*The Rondel, or Astragal*	0	3	2	8 52 0			0 5 0	0 26	0
13		*The Neck, or Frize*	0	8	2	9 1 0			0 13 2	0 22	2
14		*The List*	0	1	2	9 2 2			0 5 0	0 24	0
15		*The Rondel, or Bead-moulding*	0	2	2	9 5 0			0 17 2	0 26	0
16		*The Echinus, or Half-round*	0	7	2	9 12 2			0 25 0	0 30	0
17		*The Plint of the Capital*	0	10	0	9 22 2			0 35 0	0 31	2
18	Architrave, Frize and Cornish.	*The first Faceo*	0	10	0	9 32 2			0 10 0	0 22	2
19		*The second Faceo*	0	15	2	9 48 0			0 25 2	0 24	2
20		*The List or Supercilium*	0	1	2	9 49 2			0 27 0	0 26	2
21		*The Plint*	0	3	2	9 53 0			0 30 2	0 27	2
22		*The Zoporus Epistylum, or Frize*	0	40	0	10 33 0			1 10 2	0 22	2
23		*The List, or Supercilium*	0	2	0	10 35 0			1 12 2	0 23	2
24		*The Scimatium, or little* O G	0	5	0	10 40 0			1 17 2	0 26	2
25		*The Supercilium or List*	0	1	1	10 41 1			1 18 3	0 30	0
26		*The Sima, or greater* O G	0	8	2	10 49 3			1 27 1	0 35	0
27		*The List*	0	1	2	10 51 1			1 28 3	0 49	0
28		*The Corna, or Crown*	0	9	3	11 1 0			1 38 2	0 50	0
29		*The List*	0	1	2	11 2 2			1 40 0	0 52	0
30		*The upper Scima, or* O G	0	8	0	11 10 2			1 48 0	0 56	0
31		*The Supercilium, List, Tinea, or Eybrow*	0	1	0	11 12 0			1 49 2	1 00	0
32		*The upper List, or Plinth of the Cornish for the Tuscan Column or Order.*	0	3	0	11 15 0			1 52 0	1 2	0

Thus I have given you an Example of the *Tuscan* Order of the Measure of every Part and Member: The like may you make, from the Figures in the Book, of all the other Orders, for your particular Use and Occasion.

The

The Ground-Rules of Architecture, *Collected from the beſt Authors and Examples, by that Learned and Ingenious Gentleman Sir* Henry Wotton, *in his* Elements *of* Architecture. *Now Corrected for Publick Benefit.*

THere are ſeveral Rules or Precepts laid down by Architects concerning the Art of well Building, ſome reſpecting the Situation or total Poſture of the Building; as that it be in a good and healthy Air, not ſubject to Foggy Noiſomineſs, or Mineral Exhalations, or Malign Influence; that it be not far from ſome Navigable River or Arm of the Sea; that it have a pleaſant Proſpect, and the firſt Salutation of the Spring: But I paſs over theſe, accounting them rather Wiſhes than Precepts.

Other Rules there are touching the placing of the ſeveral parts of the Building; as that all the principal Chambers of Delight, all the Studies and Libraries be towards the Eaſt, the Morning being a Friend to the Muſes; all Offices that require heat, as Kitchins, Stillatories, Stoves, Rooms for Backing, Brewing, Waſhing or the like, towards the South. All that need a cool and Freſh Temper, as Cellars, Pantries, Butteries, Granaries, to the North: As alſo Repoſitories for Works of Rarieties in Pictures, or other Arts that require a ſteady Light. But in this, reguard is to be had to the Nature of the Region, every Nation being tied above all Rules, to a Deſcreiton of Providing againſt their own Inconveniencies.

The Rules concerning the Work it ſelf, ſome reſpect the Materials, and ſome the Form; as concerning the Material part it will not diſgrace an Architect, which doth ſo well become a Philoſopher, to look into the Properties of Stone and Wood, as that Firr-trees, Cypreſs, Ceders, and ſuch other aſpiring Plants (which being naturally inflexible downwards) are fitteſt for Poſts and Pillars, or ſuch upright uſe; on

the other ſide Oak and the like true hearty Timber being ſtrong in all poſitions, may be better truſted in croſs and traverſe work for Sommers, or girding and binding Beams, as they are termed. And ſo likewiſe to obſerve of Stone, that ſome are better within than others to bear Weather; nay to deſcend lower, to examin Sand, Lime and Clay, of all which things *Vitruvius* and other new Writers have diſcourſed without any daintineſs. And in this the *Italians* are very careful, burning their firmeſt Stone, and even fragments of Marble where it is plenty, which in time become almoſt Marble again, or at leaſt of indiſſoluble durity, as appeareth in their ſtanding Theatres: Whereas to make Lime of any refuſe Stuff, as we too commonly do in *England*, is an error of no ſmall moment in our Buildings. I ſhall cloſe with this principal caution, That ſufficient Stuff and Money be ready before we begin to build; for when we build now a piece and then another by fits, the work dries and ſinks unequally, wereby the Walls grow full of chinks and crevices; this pauſing humour is condemnded by all Authors. In the form is to be conſidered the general figuration, and then the ſeveral Members. Figures are either ſimple or mixed, the ſimple Figures are either circular or angular, and of circular either compleat or deficient, as oval: Now the exact circle is in truth a very unprofitable Figure in private Buildings, being the moſt chargeable, and much room being loſt in the bending of the Walls, beſides an ill diſtribution of the Light, except from the Center of the Roof, ſo as it is not uſual, ſave in ſome Temples and Amphitheatries; the oval and other imperfect circular Forms have the ſmall exceptions and leſs benefit of capacity.

Touching the Angular it is a true obſervation, that this Art doth neither love many Angles nor few, for firſt the Triangle which hath of all others the feweſt Sides and Corners, is of all other the moſt condemned, being indeed both incapable and infirm, and likewiſe more ſoluble into any other Form than it ſelf in the inward Partitions: As for Figures of five, ſix, ſeven or more Angles, they are fitter for Military Architecture, where the Bulwarks may be laid out at the Corners, and the Sides ſerve for the Curtains than for civil uſe, tho' there is a famous piece of *Caparola* belonging to the Houſe of *Farneſe*, caſt by *Baraccio* into the form of a Pantagone with a circle inſcribed; where the Architect did ingeniouſly wreſtle with divers Inconveniences in diſpoſing of the Lights and in ſaving the vacuities: But ſuch deſigns as theſe do aim more at Rarity than Commodity, and are rather to be admired than commended. Therefore by the Precepts and Practice of the beſt Buildings we reſolve upon Rect-angular Squares, as a mean between

tween too few and too many Angles, and are through the equal inclination of the Sides (which make the right Angle) ſtronger than the Rhomb or any other irregular Square; but whether the exact Quadrat or the long Square be the better, is not well determined, tho' I prefer the latter, provided the length do not exceed the Latitude above one third part, which would much diminiſh the Aſpect; as ſhall appear when I come to ſpeak of Symmetry and Proportion of mixed Figures, partly Circular, and partly Angular. There is a proper Objection, that they offend Uniformity, yet theſe ſeeming oppoſites, Uniformity and Variety, may be reconciled; as we ſee in our Bodies, the great Pattern of Nature, which are moſt Uniform in the whole Figuration, each ſide agreeing with the other in the Number, the Quality and Meaſure of the parts, and yet ſome are round as the Arms, ſome flat as the Hands, ſome prominent, and ſome more retired, ſo the Limbs of a noble Fabrick may be coreſpondent enough though they be various, provided always we do not run into certain extravagant Inventions whereof I ſhall ſpeak more largely when I come to the parting and caſting of the whole Work. We ought likewiſe to avoid enormous heights of ſix or ſeven Stories, as well as irregular Forms, and the contrary fault of low diſtended Fronts is as unſeemly; or again when the Face of the Building is narrow and the Flank deep. Thus much for the general Figuration or Aſpect of the Work.

Now concerning the Parts in ſeveral, all the Parts of every Fabrick may be according to *Baptiſta Alberti* compriſed under five Heads, and they be theſe.

The Foundation. The Walls. The Appertions, or Overtures. The Compartition. And the Cover.

About all which I propoſe to gether the principal Rules, and as I paſs along, touch the natural Reaſons of Art.

Firſt, Concerning the Foundation, which requireth the exacteſt Care; for if that happen to dance, it will mar all the Mirth in the Houſe. Therefore that we may found our Habitation firmly, we muſt firſt examine the Bed of Earth upon which we will Build, and then the Underſilings and Subaſtraction, as the Ancients did call it, adviſing us not to reſt upon any appearing Solidity, unleſs the whole Mould through which we cut have likewiſe been ſolid. But how deep we ſhould go in this ſearch, is not certainly determined, depending more upon Deſcretion than Regularity, according to the weight of the Work; yet *Andrea Palladio* alloweth a ſixth part of the height of the whole Fabrick, unleſs the Cellars be under ground; in which caſe he would have us found ſomewhat lower.

Some *Italians* do preſcribe, that when they have choſen the Floor or Plot, and laid out the limits of the Work, we ſhould firſt of all dig Wells and Ciſterns and other Under-conducts and Conveyances for the Suillage of the Houſe, whence may ariſe a double benefit; for both the nature of the Mould or Soil would be ſafely ſearched, and moreover thoſe open Vents will ſerve to diſcharge ſuch Vapours, as having otherways no iſſue, might peradventure ſhake the Building; this is enough for the natural grounding, which though it be not a part of the ſolid Fabrick; yet it is here fitteſt to be handled.

Now followeth the Subſtruction or Ground-work of the whole Edifice, which muſt ſuſtain the Walls, about which are theſe Rules, firſt that the bottom be perciſely level, where the *Italians* therefore commonly lay a Platform of good Board; then that the loweſt ledge or row be meerly of Stone, and the broader the better, cloſely laid without Morter, which is a general caution for all parts in Building that are contiguous to Board or Timber, becauſe Lime and Wood are inſociable, and if any where unfit confiners, then moſt eſpecially in the Foundation; thirdly, that the breadth of the Subſtruction be at leaſt double to the inſiſtant Wall, and more or leſs as the weight of the Fabrick ſhall require; for Deſcretion may be freer than Art.

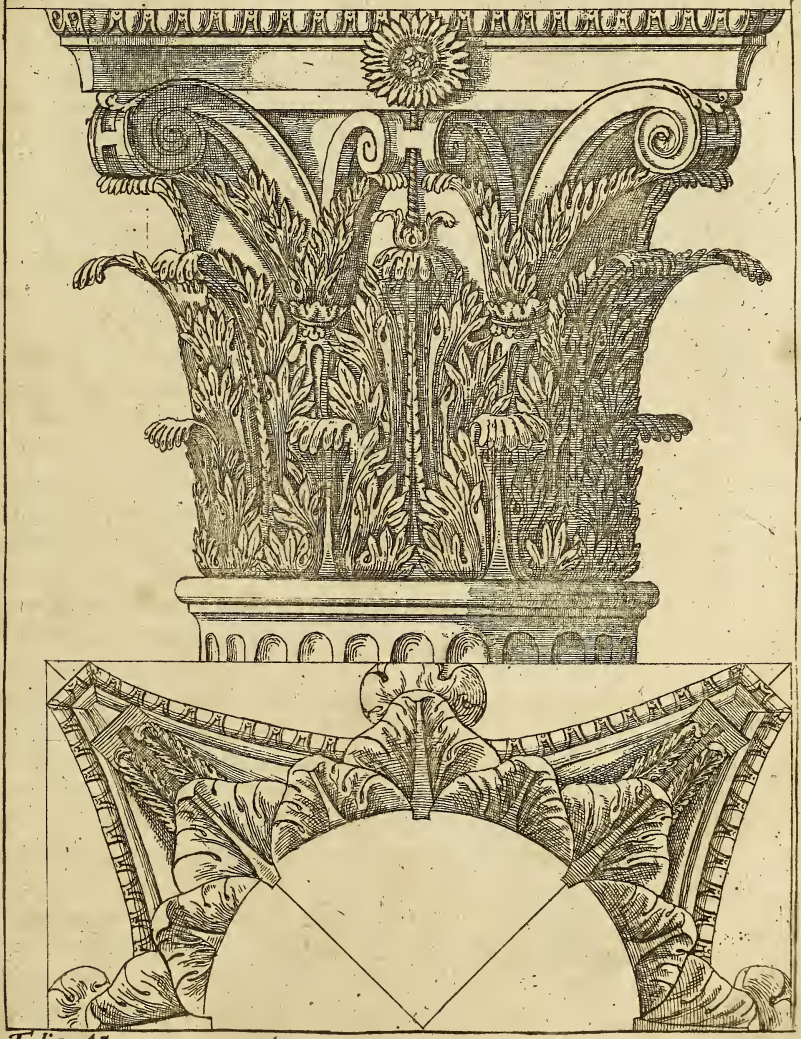
Now the Foundation being ſearch'd, and the Subſtruction made, we muſt next ſpeak of the Walls.

Walls are either entire and continual, or intermitted, and the Intermiſſions be either Pillars or Pilaſters; concerning the entire Walls there are theſe Conſiderations. That the Walls be moſt exactly perpendicular to the Ground-work; for the right Angle (thereon depending) is the true cauſe of Stability both in Artificial and natural Poſitions, a Man likewiſe ſtanding firmeſt when he ſtands uprighteſt. That the maſſieſt and heavieſt Materials be the loweſt, as fitter to bear than to be born. That the Work as it riſeth, diminiſheth in thickneſs proportionably for eaſe both of weight and of expence. That certain ledges of more ſtrength than the reſt, be interlaid like Bows to ſuſtain the Fabrick from total ruin, if the under parts ſhould decay. Laſtly, That the Angles be firmly bound, which are the Nerves of the whole Edifice, and therefore are commonly fortified by the *Italians* even in their Brick Building, on each ſide of the Corners with well ſquared Stone, yielding both Strength and Grace. And ſo much touching the entire or ſolid Wall.

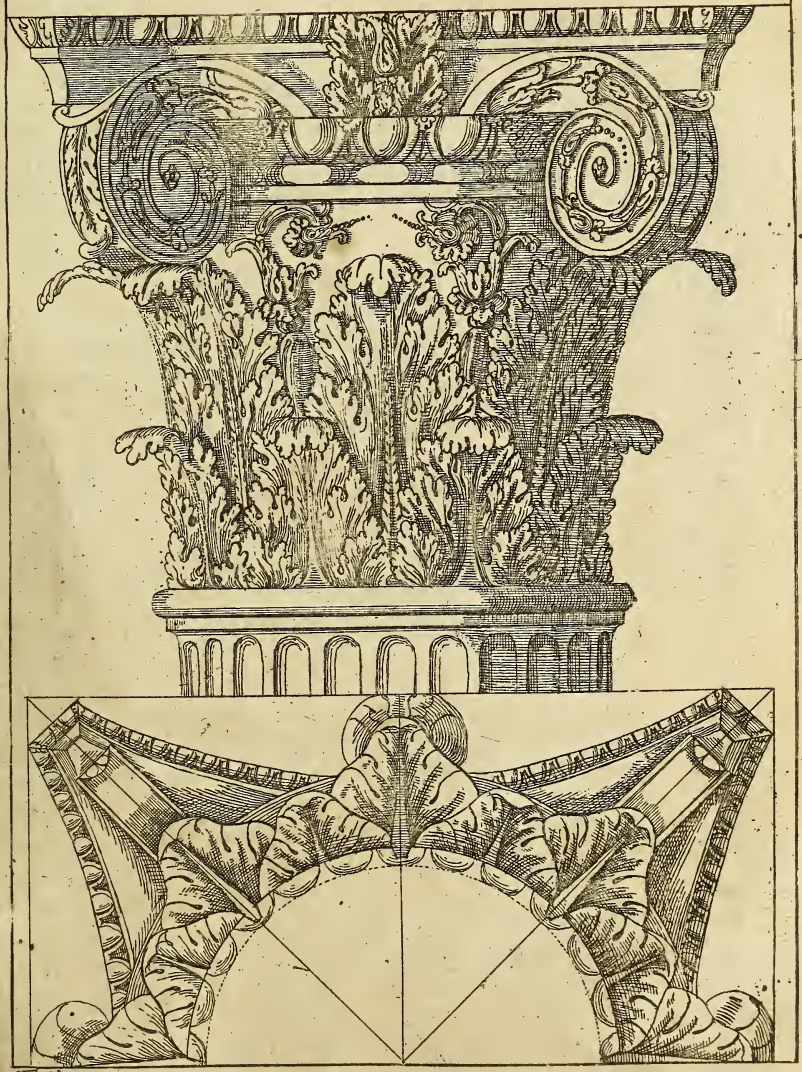
The Intermiſſions (as hath been ſaid) are either Pillars or Pilaſters: Pillars, which are commonly called Columns, of them there are five Orders.

The

The Corinthian Capital.



The Roman Capital



Folio 45

The Tuscan. The Dorick. The Ionick. The Corinthian.

And the *Compound Order*, or as some call it the *Roman*, others more generally the *Italian*.

In which five Orders I will first consider their Communities, and then their Proprieties.

Their Communities (as far as I observe) are principally three: First, they are all round; for tho' some conceive *Columna Atticurges* mentioned by *Vitruvius*, to have been a squared Pillar, yet we must pass it over as irregular, never received among these Orders, no more than certain other licentious Inventions of wreathed and vined and figured Columns.

Secondly, They are all diminished or contracted incensibly more or less, according to the Proportion of their heights from one third part of their Shaft upwards, which *Philander* doth prescribe by his own precise measuring of the Ancient Remainders as the most graceful Dimunition. And here I must blame a Practice familiar in some places, of making Columns swell in the middle as if they were sick of some Timpany, unseemly to the very Judgment of sight, and contrary to the Original and Natural Type in Trees, which at first was imitated in Pillars, as *Vitruvius* himself observeth.

Thirdly, They have all their Undersettings or Pedestals in height, a third part of the whole Column comprehending the Base and Capital, and their upper Adjuncts, as Architrave, Frize and Cornish, a 4th part of the said Pillar. Which Rule of singular use and facility I find settled by *Jacobo Baraccio*, a very Good Author. These are their most considerable Communities and Agreements.

Their Proprieties or Distinctions will best appear by some reasonable and plain Description of them all with their Architrave, Frize and Cornishes.

First, Therefore the *Tuscan* is a plain massy rural Pillar, resembling some sturdy well-limb'd Labourer homely clad, as *Virtuvius* makes the Comparison: The length thereof shall be six Diameters, or as *Scamozzi* makes it six and half of the grossest of the Pillar, being a very natural Proportion. The distance or Intercolumniation may be near four of his own Diameters, because the Materials commonly laid over this Pillar, were rather of Wood than Stone through the lightness whereof the Architrave could not suffer though thinly supported, nor the Column it self being so substantial. The Contraction aloft shall be (according to the most received Practice) one fourth part of his thickness below. To conclude, the *Tuscan* is of all the rudest Pillar, and his principal Character simplicity.

The

The *Dorick* Order is the graveſt that hath been received into civil uſe, preſerving in compariſon of thoſe that follow a more maſculine Aſpect, and little trimmer than the *Tuſcan* that went before; ſave a ſober Garniſhment now and then of Lyons heads in the Corniſh, and of Trigliphs and Metopes always in the Frize, ſometimes likewiſe, but rarely channeled, and a little ſlight Sculpture about the Hypotrachelion or Neck under the Capital: The length ſeven Diameters, and according to *Scamozzi*, ſeven and a half, his rank or Degree is the loweſt by all congruity, as being more maſſy than the three, and ſo better able to ſupport. The Intercolumniation thrice as much as his thickneſs below; the contraction aloft one fifth of the ſame meaſure, he is beſt known by his place when he is in Company, and by the peculiar Ornament of his Frize before-mentioned when he is alone.

The *Ionick* Order doth repreſent a kind of Feminine ſlenderneſs, not like a light Huſwife, but in a decent Matron-like dreſſing. The length eight Diameters in degree as in ſubſtantialneſs next above the *Dorick*, ſuſtaining the third, and adorning the ſecond ſtory, the Intercolumiation two of his own Diameters, the contraction above one ſixth part. And is beſt known by his Trimmings, for the body of this Column is perpetually channeled like a thick plaited Gown: The Capital dreſſed on each ſide, not much unlike Womens Wires in a ſpiral wreathing, which they call the *Ionian Voluta*; the Corniſh indended; the Frize ſwelling like a Pillow, theſe are his beſt Characters.

The *Corinthian* is a Column laſcarouſly decked like a Curtizan, and therein participating (as all Inventions do) of the place where they were firſt born, *Corinth* having been without controverſy one of the wantoneſt Towns in the World. This Order is of nine Diameters, his degree one ſtage above the *Ionick*, and always the heigheſt of the ſimpleſt Orders. The Intercolumniation two of his Diameters, and a fourth part more, which is of all other the comlieſt diſtance. The contraction one ſeventh part. In the Corniſh doth Dentils and Modiglions. The Frize adorned with all kinds of Figures and various Compartments. The Capital cut into one of the Beautifulleſt Leafs that Nature doth yield, which is the *Acanthus* or *Branca Urſina*, Bear's Foot. In ſhort, as Plainneſs characterize the *Tuſcan*, ſo muſt Delicacy and Variety the *Corinthian* Pillar, Beſides the height of the Rank

The laſt is the Compounded or *Roman* Order; his Name being a brief of his Nature; for this Pillar is nothing in effect but a medly of all the precedent Ornaments, and though, the moſt richly trimmed, yet the pooreſt in this that he is a borrower of all his Beauty. His

length

length a mean between the *Ionick* and *Corinthian*, according to *Scamozzi*; though some will have him the highest, as of 10 Diameters, the Intercolumniation somewhat less than two Diameters, the contraction one eighth part less above than below, his degree should be the highest, But few Palaces ancient or modern exceed the third of the Civil Orders; you may easily know him by the mixture of his Ornaments. And so much touching the five Orders of Columns, which I shall conclude with two or three not impertinent Cautions.

First, That where more of these Orders than one shall be set in several Stories or Contignations, there must be an exquisite care to place the Columns precisely one over another, that so the solid may answer to the solid, and the vacuities to the vacuities; as well for Beauty as Strength of the Fabrick; and by this Caution the consequence is plain, that when we speak of the Intercolumnation or Distance which is due to each Order, we mean in a *Dorick*, *Ionick*, *Corinthian* Porch, or Cloister, or the like of one Contignation, and not in storied Buildings.

Secondly, Let the Columns above be a fourth part less than below, saith *Vitruvius*; which doth appear a strange Precept, and would seem reasonable rather to make them a fourth part bigger, because according to the Optick Rule that the higher they are the less the Diminution aloft should be, because the Eye doth naturally contract all objects more or less according to their distance but *Vitruvius* acquits himself like a wise Merchanick; the Natural reason before the Mathematical.

That therefore they above should be a fourth part less, that those beneath may better sustain them.

A third Caution shall be, That all the projected or jetting parts (as they are termed) be very moderate, especially the Cornishes of the lower Orders; for while some think to give them a beautiful and royal Aspect, by their largeness they sometimes hinder both the Light within, and likewise detract much from the view of the Front without. I need say no more concerning Columns and their Adjuncts, only answer one familiar Objection: It will perchance be said, that this Doctrine touching the five Orders were fitter for the Quarries of *Asia*, which yielded 127 Columns of 60 foot high to the *Ephesian* Temple, or for *Numidia* where Marbles abound, than for the Spirits of *England*, who must be contented with more ignoble Materials. To which I answer, that this need not discourage us. For I have often at *Venice* viewed with much Pleasure an Antiporch after the *Greek* manner, raised by *Andrea Palladio* upon eight Columns of the Compounded Order, the Basis of Stone without Pedestals, the Shafts or Bodies of

meer

meer Brick; foot and half thick in the Diameter below, and consequently thirty five foot high, than which mine Eye hath never yet beheld any Columns more stately of Stone or Marble; for the Bricks having been first formed in a Circular Mould, and then cut before their burning, into four quarters or more, the sides afterwards joyn so closely, and the points concenter so exactly, that the Pillars appear one entire Piece; which short Description I could not omit, that thereby may appear how in truth we want rather Art than Stuff to satisfy our greatest Fancies.

After Pillars the next in Order are Pilasters, touching which I will briefly collect these Notes. Pilasters must not be to tall and slender, lest they resemble Pillars; nor too dwarfish and gross, lest they imitate the Piles or Peers of Bridges; smoothness doth not so naturally become them as a rustick Superficies, for they aim more at State and Strength than Elegancy. In private Buildings they ought not to be narrower than one third, nor broader than two parts of the whole vacuity between Pilaster and Pilaster; but to those that stand at the Corners, may be allow'd a little more Latitude by discretion for strength of the Angles: In Theatres and Amphitheatres, and such weighty Works, *Palladio* observeth them to have been as broad as the half, and now and then as the whole vacuity; he noteth otherways, and others consent with him, that there true proportion should be an exact square; but for lessening an expence and enlarging of room, they are commonly narrower in Flank than in Front. Their principal Grace doth consist in half or whole Pillars apply'd unto them; in which case it is well noted by Authors, that the Columns may be allow'd somewhat more than their Ordinary length, because they lean unto so good Supporters. And thus much shall suffice touching Pilasters, which is a cheap, and a strong, and a noble kind of Structure.

Now because they are oftner both for Beauty and Majesty found Arched than otherwise: I am here orderly led to speak of Arches, and under the same Head of Vaults, for an Arch is nothing indeed but a contracted Vault, and a Vault is but a dilated Arch.

Therefore to handle this business both compendiously and fundamentally, I will resolve the whole business into a few Theorems.

Theorem 1. All solid Materials free from impediment do descend perpendicularly downwards, because Ponderosity is a natural inclination to the Center of the World, and Nature performeth her Motions by the shortest Lines.

Theorem

Theorem 2. Bricks moulded in their ordinary Rectangular form, if they ſhall be laid one by another in a level row between any Supporters, ſuſtaining the two ends, then all the pieces between will neceſſarily ſink even by their own natural gravity, and much more if they ſuffer any depreſſion by other weight above them becauſe their ſides being parallel they have room to deſcend perpendicularly without impeachment according to the former *Theorem:* Therefore to make them ſtand, we muſt either change their poſture, or their figure, or both.

Theorem 3. If Bricks moulded, or Stones ſquar'd *cuneatim* (that is wedg-wiſe, broader above than below) ſhall be laid in a row level with their ends ſupported as in the precedent *Theorem*, pointing all to one Center, then none of the pieces between can ſink 'till the Supporters give way; becauſe they want room in that figuration to deſcend perpendicularly: But this is yet a weak piece of Structure, becauſe the Supporters are ſubject to much impulſion, eſpecially if the Line be long; for which reaſon this form is ſeldom us'd but over Windows or narrow Doors; therefore to fortifie the Work, as in this third *Theorem* we have ſuppoſed the Figure of all the Materials different from thoſe in the ſecond, ſo likewiſe we muſt now change the Poſture, as will appear in the *Theorem* following.

Theorem 4. If the Materialls figured as before wedge-wiſe, ſhall not be diſpoſed levelly, but in form of ſome Arch or Portion of a Circle pointing all to the ſame Center: In this Caſe neither the pieces of the ſaid Arch can ſink downwards through want of room to deſcend perpendicularly, nor the Supporters or Butments (as they are term'd) of the ſaid Arch can ſuffer ſo much violence as in the precedent flat Poſture, for the roundneſs will always make the incumbent weight rather to reſt upon the Supporters than to ſhove them; whence may be drawn an evident Corollary, that the ſafeſt of all Arches in the Semicircular, and of all Vaults the Hemiſphere, though not abſolutely exempted from ſome natural weakneſs, as *Barn. Baldi*, Abbot of *Guaſtalla*, in his Comment upon *Ariſtotle*'s Mechanicks doth very well prove; whence I note, That when any thing is Mathematically demonſtrated weak, it is much more Mechanically weak; errours evermore occurring more eaſily in the Management of groſs Materials than lineal deſigns.

Theorem 5. As Semicircular Arches or Hemiſpherical Vaults being rais'd upon the Total Diameter be of all other the roundeſt, and conſequently the ſureſt by the precedent *Theorem*; ſo thoſe are the gracefulleſt, which keeping preciſely the ſame height, ſhall yet be di-

ſtended one fourteenth part longer than the ſaid intire Diameter, which addition of diſtent will confer much to their Beauty, and detract but little from their ſtrength. This Obſervation I find in *Leon. Baptiſta Alberti*; but the Practice how to preſerve the ſame height, and yet diſtend the ends of the Arch, is in *Albert Durers* Geometry, who taught the *Italians* many an excellent Line of great uſe in this Art.

Upon theſe five *Theorems* all the skill of Arching and Vaulting is grounded: As for thoſe Arches which our Artizans call of the third and fourth point, and the Tuſcan Writers *di terzo* and *di quarto acuto*, becauſe they always concur in an acute Angle, and do ſpring from the diviſion of the Diameter into three, four, or more parts at pleaſure; I ſay, theſe both for the natural imbecility of the ſharp Angle it ſelf, and likewiſe for their very uncomlineſs, ought to be exiled from judicious Eyes, and left to their firſt Inventors the *Goths* or *Lumbards*, amongſt other Reliques of that barbarous Age.

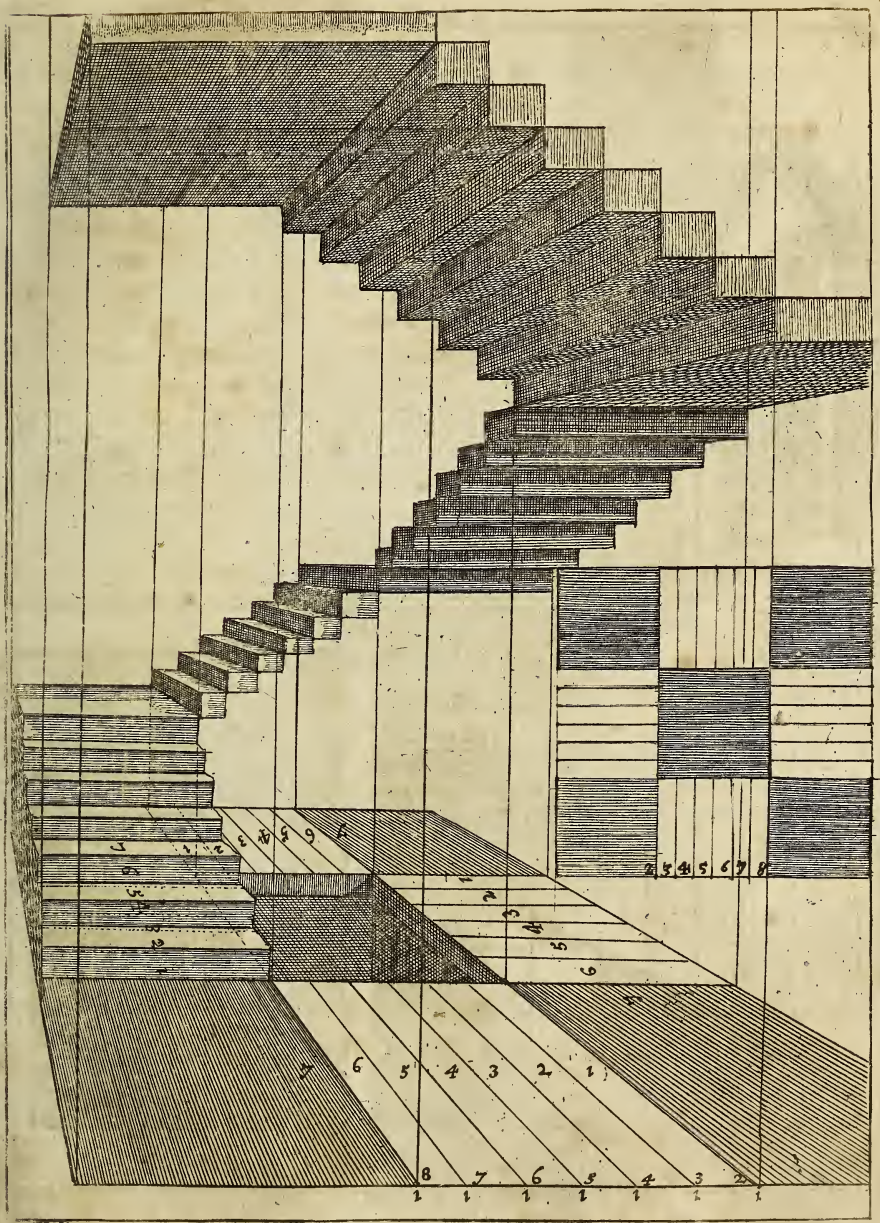
Thus of my firſt Partition of the parts of every Fabrick into five Heads; having gone through the two former, and been incidently carried into this laſt Doctrine touching Arches and Vaults, the next now in order are the Apertions, under which term I do comprehend Doors, Windows, Stair-Caſes, Chimneys, or other Conducts; in ſhort, all Inlets or Outlets, to which belongs two general Cautions.

Firſt, That they be as few in number, and as moderate in dimenſion, as poſſibly may conſiſt with other due reſpects; for in a word, all openings are weakenings.

Secondly, That they do not approach too near the Angles of the Walls, for it were indeed a moſt eſſential Solœciſm to weaken that part which muſt ſtrengthen all the reſt: A Precept well recorded but ill practiſed by the Italians themſelves, particularly at *Venice*, where I have obſerv'd divers *Pergoli* or *Meniana* (as *Vitruvius* ſeemeth to call them, which are certain balliſed Outſtandings to ſatisfy curoſity of ſight) very dangerouſly ſet forth upon the very point it ſelf of the Mural Angle.

Before I come to the caſting and comparting of the whole work (being indeed the very difinitive ſum of this Art, to diſtribute uſefully and gracefully a well choſen Plot) I ſhall collect ſome Notes belonging to theſe particular Overtures.

Of Doors and Windows. Theſe Inlets of Men and Light I couple together, becauſe I find their due demenſions brought under one Rule, by *Leon. Alberti* (a learn'd ſearcher) who from the School of *Pythagoras* (where it was a fundamental Maxim, that the Images of all things are laten



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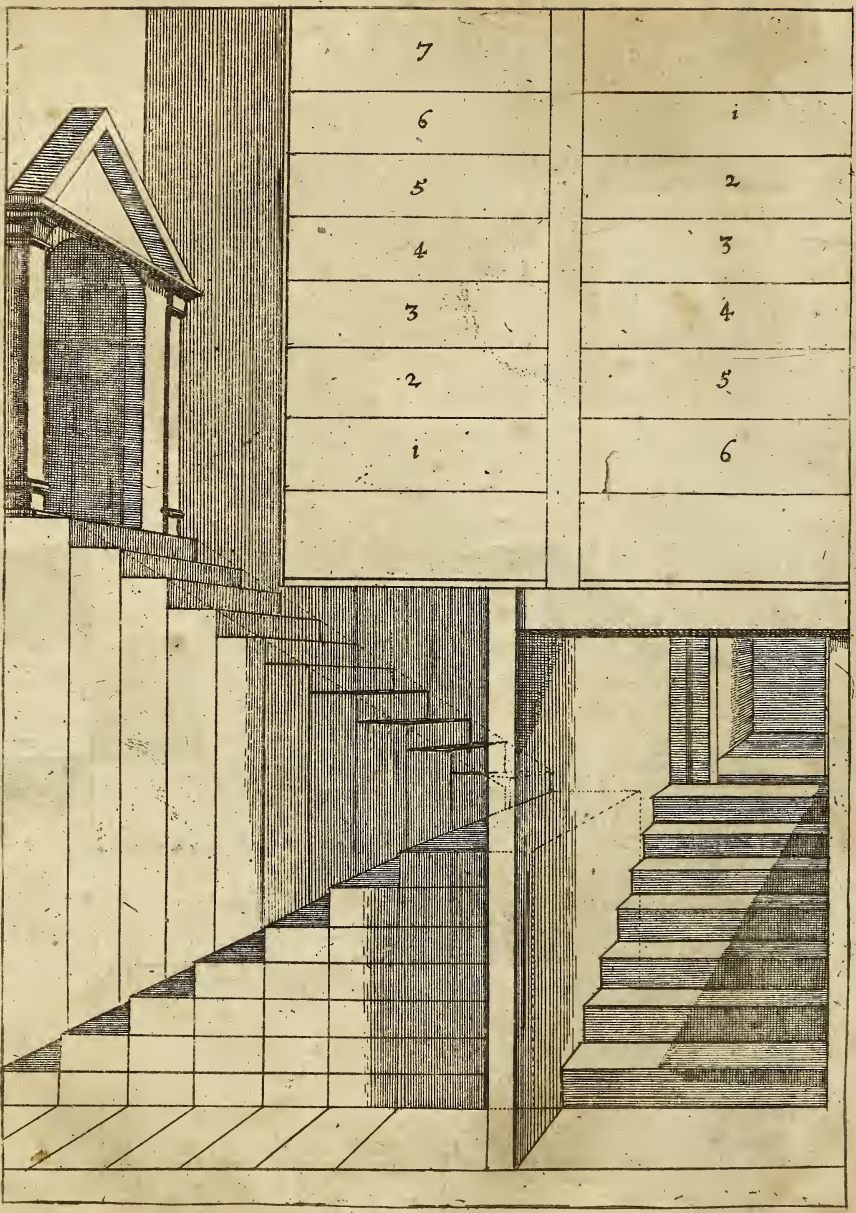
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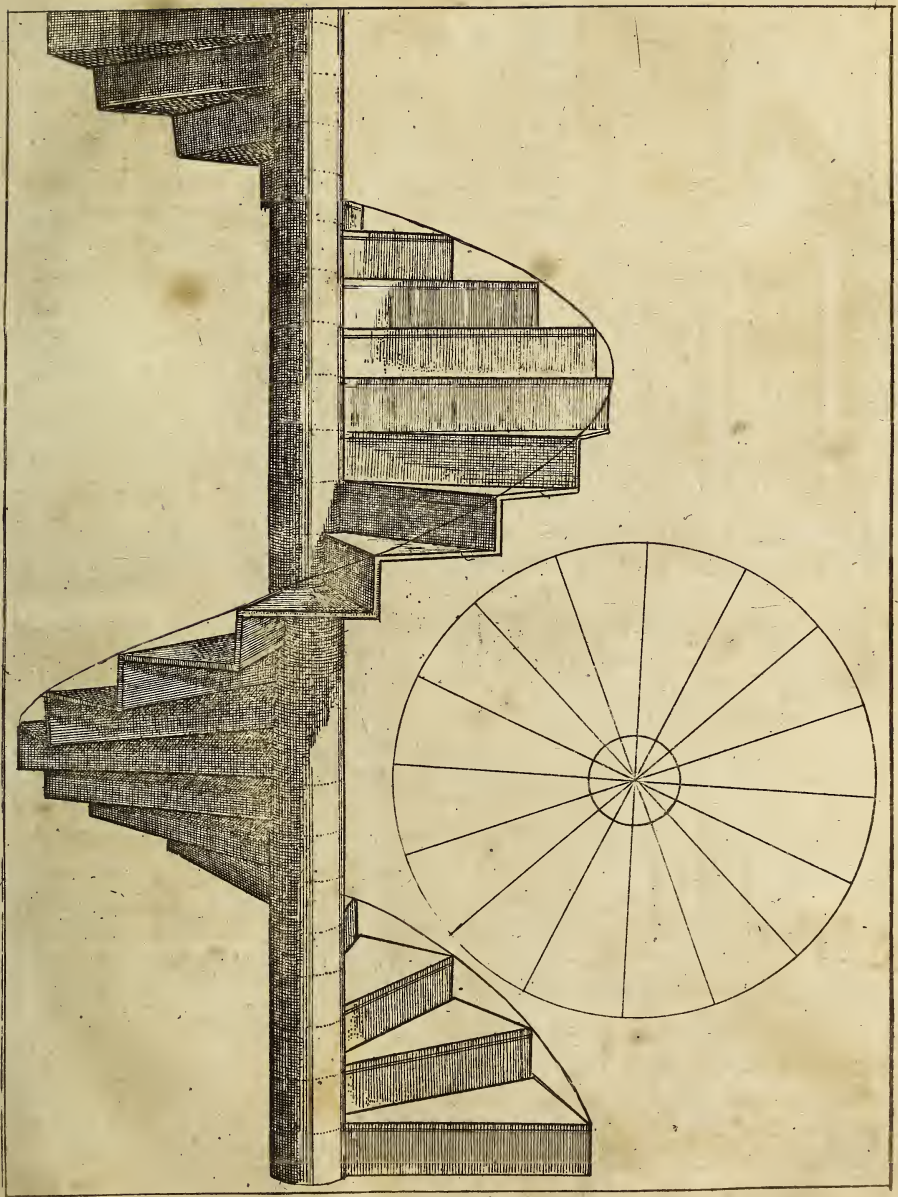

latent in numbers) both determine the comlieſt proportions between breadths and heights, namely the Symmetry of two or three in their breadth and length, in orders the double, as 2 to 4, there will indubitably reſult from either a graceful and harmonious contentment to the Eye. Our Maſter *Vitruvius* ſeems to have been an extream lover of luminous Rooms, and indeed I muſt confeſs that a frank light can misbecome no Edifice, yet on the other ſide we muſt take heed not to make a Houſe all Eyes like *Argus*, which in northern Climates would be too cold, in Southern too hot. Beſides there is no part of Building more expenceful than Windows, or more ruinous, not only for that vulgar reaſon as being expoſed to all Wind and Weather, but becauſe conſiſting of ſo different and unſociable pieces, as Wood, Iron Lead, and Glaſs, and thoſe ſmall and weak, and eaſily ſhaken.

Of Doors there is this diſtinction; ſome were called *Fores*, ſome *Valvæ*; Thoſe, as the word may ſeem to import, did open outwards: Theſe inwards, and were commonly of two Leaves as Panes (as we call them) thereby requiring indeed a leſſer circle in their unfolding, and therefore much in uſe among the Italians at this day. But I charge them with an Imperfection, for though they let in as well, yet they keep out worſe.

Of Stair-Caſes. To make a compleat Stair-Caſe is a curious piece of Architecture; the vulgar cautions are theſe.

That it have a liberal light againſt all Caſualties of ſlips and falls.

That the ſpace above the Head be large and airy, becauſe a Man doth ſpend much breath in breathing.

That the half ſpaces be well diſtributed at competent diſtances, for repoſing on the way.

That to avoid encounters, and beſides to gratify the beholder, the whole Stair-Caſe have no niggard Latitude, that is for the principal Aſcent in Royal Building at the leaſt ten foot,

That the breadth of every ſingle ſtep or ſtair be never leſs than one foot, nor more than 18 inches.

That they exceed by no means half a foot in their height or thickneſs, for our legs do labour more in elevation than in diſtention.

That the ſteps be laid where they joyn ſomewhat ſloping, that the foot may in a ſort aſcend and deſcend together; which though obſerved by few, is a ſecret and delicate deception of the pains in mounting.

Laſtly, To reduce this Doctrine to ſome natural or at leaſt Mathematical ground, *Vitruvius* borroweth theſe proportions that make the ſides of a Rect-angular Triangle; that is, three for the Perpendicular

from the ſtair-head to the ground, 4 for the ground-line it ſelf or receſſion from the Wall, and 5 for the whole inclination or ſlopeneſs in the Aſcent. There are likewiſe Spiral or Cocleſtairs, and ſometimes running about a Pillar, ſometimes vacant wherein *Palladio* (a Man very expert in this point) was wont to divide the Diameter of the 1ſt ſort into three parts, yielding one to the Pillar and two to the ſteps of the ſecond, into 4 whereof he gave 2 to the Stairs, and 2 to the Vacuity, which had all their Light from above, and this is in exact Oval is a Maſter-piece. You have here inſerted the Types of ſeveral Stair-Caſes with their Ichnography; one whereof is a piece of Rarity, being a pair of double Stairs, whereon 2 Perſons, the one aſcending, the other deſcending, ſhall not come at one another, made by *Piedro del Bergo*, and *Jehan Coſſin* at *Sciamburg* at *France* in the King's Palace.

Deſcribe a Semicircle for the Ichonagraphy, which divide in 12 equal Parts, and in it deſcribe a ſmaller Circle as at *C*. For the bigneſs of the Newel draw lines from thoſe Diviſions in the great Semicirle into the Semicirle made for the bigneſs of the Newel, ſo will that Semicircle alſo be divided into 12 equal parts; then on every of the points in the great Semicircle erect Perpendiculars, and thoſe Perpendiculars ſhall ſhew the ends of each reſpective ſtep; as the Perpendicular at 11 bounds the outward end of the firſt ſtep, the Perpendicular at 22 bounds the 2d. ſtep, *&c.* to 24, which makes good a whole Circle in the Ichnography, and Perpendiculars erected from the inner Semicircle, mark on the Newels the ends of the ſame ſteps: Work the ſame way with the ſteps on your Right-hand. The Newel is pierced through in divers places to let in light.

Of Chimneys. The *Italians*, who make frugal Fires, are not in this caſe the beſt Counſellors, therefore from them we may better learn how to raiſe fair Mantles within, and how to diſguiſe gracefully the ſhafts of Chimneys abroad; therefore I ſhall lay down the Obſervations of *Phil. de l'Orme*, a Man deligent in this part of Work.

Firſt he obſerveth, that who in the diſpoſition of the Building will conſider the Region and the Winds that ordinarily blow from this or that Quarter, might ſo caſt the Rooms, which need moſt fire, that he ſhould little fear the incommodity of Smoke. But if the error lies in the Structure it ſelf; then he makes a Logical Enquiry, That either the Wind is too much let in above at the mouth of the Shaft, or the Smoke ſtifled below. If none of theſe, then there is a repulſion of the Fume by ſome higher Hill or Fabrick that overtops the Chimney; if likewiſe not this, then he concludes that the room is little and cloſe, ſo as the Smoke

Smoke cannot iſſue wanting a ſupply of Air; and ſo having a Natural Reaſon of the Cauſe, we may apply ſuitable Remedies.

Touching Conducts for the Suillage and other Neceſſities of the Houſe, (which how baſe ſoever in uſe, yet for the health of the Inhabitants are as conſiderable as the reſt) I find in Authors this Counſel, that Art ſhould imitate Nature in thoſe ignoble Conveyances, and ſeparate them from ſight (where there wants a running Water) into the moſt remote, and loweſt, and thickeſt part of the Foundation, with ſecret vents poſting up through the Walls, like a Tunnel to the wide Air aloft.

Thus, having conſider'd the Apertions, and Overtures according to their particular Requiſites, I come to the Contexture of the whole Work under the term of Compartition, into which (being the maineſt piece) I cannot enter without a few general Precautions.

Firſt, Let no Man that intendeth to build, ſettle his fancy upon a Draught of the Work in Paper, how exactly ſoever meaſured or neatly ſet off in perſpective, without a Model or Type of the whole Structure, and of every parcel or partition in Board or Wood.

Next, That the ſaid Model be as plain as may be without Colours or other beautifying, leſt the Pleaſure of the Eye preoccupate the Judgment.

Laſtly, The bigger this Type is, the better; not that I would perſuade a Man to ſuch an Enormity, as that Model made by *Ant. Labacco* of St. *Peter*'s Church in *Rome*, containing 22 foot in length, 16 in breadth, and 13 in height, and coſting 4184 Crowns, the price of a reaſonable Chappel. Yet in a Fabrick of 30 or 40000 *l.* 30 *l.* may be expended in an exact Model; for a little Penury in the Premiſes may eaſily breed ſome Abſurdity of a far greater Charge in the Concluſion.

Now after theſe Premoniſhments, I come to the Compartition it ſelf, by which is underſtood a graceful and uſeful Diſtribution of the whole Ground-plot, both for Rooms of Office, and of Reception or Entertainment, as far as the Capacity thereof, and the Nature of the Country will comport.

The gracefullneſs will conſiſt in a double Analogy or Correſpondency, 1ſt. between the parts and the whole, whereby a great Fabrick ſhould have great Partitions, great Lights, great Entrances, great Pillars or Pilaſters; in ſum, all the parts great. The next between the parts themſelves, not only conſidering the breadth and length, as before, when we ſpeak of Doors and Windows, but likewiſe their height, a point hardly reducible to any general Precept.

True

True it is, the Ancients did determine the Longitude of all Rooms which were longer than broad, by the double of their Latitude; and the height half as much more as the Latitude, which Dimensions modern Architects vary upon discretion: Sometimes squaring the Latitude, and then making the Diagonal or overthwart Line from Angle to Angle of the said square; the measure of the height sometimes more, but seldom lower, than the breadth it self.

The usefulness consists in a sufficient number of Rooms of all sorts, and their apt coherence without distraction, without confusion, that it may be well united, and may appear airy and spirituous, fit for the welcome of cheerful Guests; about which the greatest difficulty will be in contriving the Lights and Stair-Cases: In which respect the ancient Architects were at much ease; for both the Greeks and Romans (of whose private Dwellings *Vitruvius* hath left some Description) had commonly two cloistered open Courts, one serving for the Womens side, and the other for the Men, who now-a-days would perchance take so much separation unkindly. Howsoever by this means the reception of Light into the Body of the Building was very prompt both from without and from within, which we must now supply by some open form of the Fabrick, or among graceful refuges by Tarrasing any Story which is in danger of Darkness, or lastly, by perpendicular Lights from the Roof, of all others the most natural: For the second difficulty, which is casting in the Stair-Case, which is no hard point of itself, but as they are incumbrances of room for other use, I have marked a willingness in the Italian Artizans to distribute the Kitchin, Pantry, Bake-house, Washing-rooms, and even the Buttery likewise under ground, next above the Foundation, and sometimes level with the Floor of the Cellar, raising the first Ascent into the House fifteen foot or more for that end, which besides removing Annoys out of sight, and gaining much room above, doth also by the Elevation of the Front add Majesty to the whole Aspect; and with such a disposition of the principal Stair-Case which commonly doth deliver us into the plain of the second Story, there may be wonders done with a little room. But though Petty-Offices may be well enough so remote, yet by the natural Hospitality of *England* the Buttery must be more visible, and we need perchance for our Raunges a more spacious and illuminous Kitchin than the aforesaid Compartition will bear, with a more competent nearness to the Dining-Room. It is likewise necessary to contrive a Room for a Conservatory of the Meat that is taken from the Table 'till the Waiters eat, which with us by an old fashion is more unseemly set by in the mean time.

Now

Now touching the distribution of Lodging Chambers, I must here reprove a Fashion, which hath prevailed through *Italy*, without ancient Examples: Namely, that they so cast their Partitions, as when all Doors are open, a Man may see through the whole House; which doth necessarily put an intolerable servitude upon all the Chambers, save the inmost, whence none can arrive but through the rest, or else the Walls must be extream thick for secret Passages. And yet this will not serve the turn, without at least three Doors to every Room, a thing most insufferable in cold and windy Regions, and every where no small weakning to the whole Work; being only grounded upon the fond Ambition of displaying to a Stranger all our Furniture at one sight: There being another defect, which necessarily follows such a servile disposing of inward Chambers, that they must be forced to make as many common great Rooms as there shall be several Stories; which (besides that they are usually dark, a point hardly to be avoided, running as they do through the middle of the whole House) do likewise devour so much Places that thereby they want other Galleries and Rooms of Retreat. Thus having given you general Lights and Directions, and discover'd some Faults, the rest must be committed to the Sagacity of the Architect, who will be often put to divers ingenious shifts, when he is to wrestle with Scarcity of Ground: As sometimes to damn one Room (though of good use) for the benefit and beauty of all the rest; another while to make those fairest which are most in sight, and to leave the other (like a cunning Painter) in shadow. I will close this part, touching Compartition, as cheerfully as I can, with a short Description of a feasting or entertaining Room after the *Ægyptian* manner, who seem (at least 'till the time of *Virtuvius*) from the ancient *Hebrews* and *Phœnicians* (whence all knowledge did flow) to have retained with other Sciences in a high degree also the Principles and Practice of this magnificent Art; there being no form for such a Royal use comparable imagined like that of the aforesaid Nations.

Let us conceive a Floor or Area of goodly length (for example at least of 120 foot) with the breadth somewhat more than half of the Longitude: About the two longest sides and head of the said Room, shall run an Order of Pillars, which *Palladio* doth suppose *Corinthian*. Supplying that point out of *Greece*, because we know no Order proper to *Ægypt*; the fourth side I will leave free for Entrance: On the foresaid Pillars was laid an Architrave, which *Vitruvius* mentioneth alone, *Palladio* adds thereunto (and with reason) both Frize and Cornish, over which went up a continued Wall, and therein half or three quarter Pillars, answering directly to the Order below, but a fourth part less; and between these half Columns above, the whole Room was windowed round about.

Now from the lowest Pillars there was laid over a Contignation or Floor born upon the ourward Wall, and the head of the Columns with Tarace and Pavement *sub dio*, saith our Master, and so indeed he might safely determine the matter in *Ægypt*, where they fear no Clouds; therefore *Palladio* (who leaveth this Tarace uncovered in the middle and ballised about) did perchance construe him rightly, though therein discording from others. Always we

must

muſt underſtand a ſufficient breadth of Pavement left between the open part of the Windows, for ſome delight of Spectators that might look down into the Room. The Latitude I have ſuppoſed contrary to ſome former Poſitions a little more than half the length; becauſe the Pillars ſtanding at a competent diſtance from the outmoſt Wall, will by interception of the ſight, ſomewhat in appearance diminiſh the breadth: In which caſe (as I have ſaid before) Deſcretion may be more licentious than Art. This is the Deſcription of an *Ægyptian* Room for Feaſts and other Jollities; about the Walls whereof we muſt imagine intire Statues placed below, and illuminated by the deſcending Light from the Tarace, as likewiſe from the Windows between the half Pillars above. So as this Room had abundant and advantageous Light; and beſides other garniſhing muſt needs receive much State by the height of the Roof, that lay over two Orders of Columns.

And ſo having run through the four parts of my firſt general Diviſion, namely, Foundation, Walls, Apertions, and Compartition: The Houſe may now have leave to put on his Hat, having hitherto been uncover'd it ſelf, and conſequently unfit to cover others; which point, though it be the laſt of this Art in Execution, yet it is always in Intention the firſt; for who would build but for ſhelter? I ſhall now only deliver a few of the propereſt, and (as I may ſay) Naturaliſt Conſiderations that belong to this remaining Piece.

There are two Extremities to be avoided in the Cover or Roof, that it be not too heavy nor too light, the firſt will ſuffer a vulgar Objection of preſſing too much the Under-work. The other containeth a more ſecret Inconvenience; for the Cover is not only a bare Defence, but likewiſe a kind of a Band or Ligature to the whole Fabrick, and therefore would require ſome reaſonable weight; but of the two, a Houſe-top heavieſt is the worſt; next, there muſt be a care of equality, that the Edifice be not preſſed on the one ſide more than on the other. And here *Palladio* doth wiſely adviſe that the inward Walls might bear ſome good ſhare in the Burden, and the outward be the leſs charged. Thirdly, the *Italians* are very careful in giving the Cover a graceful Pendence or Slopeneſs, dividing the whole breadth into nine parts, whereof two ſhall ſerve for the Elevation of the higheſt Top or Ridge from the loweſt. But in this point, the quality of the Region is conſiderable; for as our *Vitruvius* inſinuateth, thoſe Climes that fear the falling and lying of much Snow, ought to provide more inclining Pent-houſes, and Comlineſs muſt yield to Neceſſity.

Thus have you breſſly laid down, from the beſt Authors, the Ground-Rules of the Art of Building; which being well conſider'd, may be of great uſe to the Ingenious Architect in the managing of any Royal or Noble Deſign.

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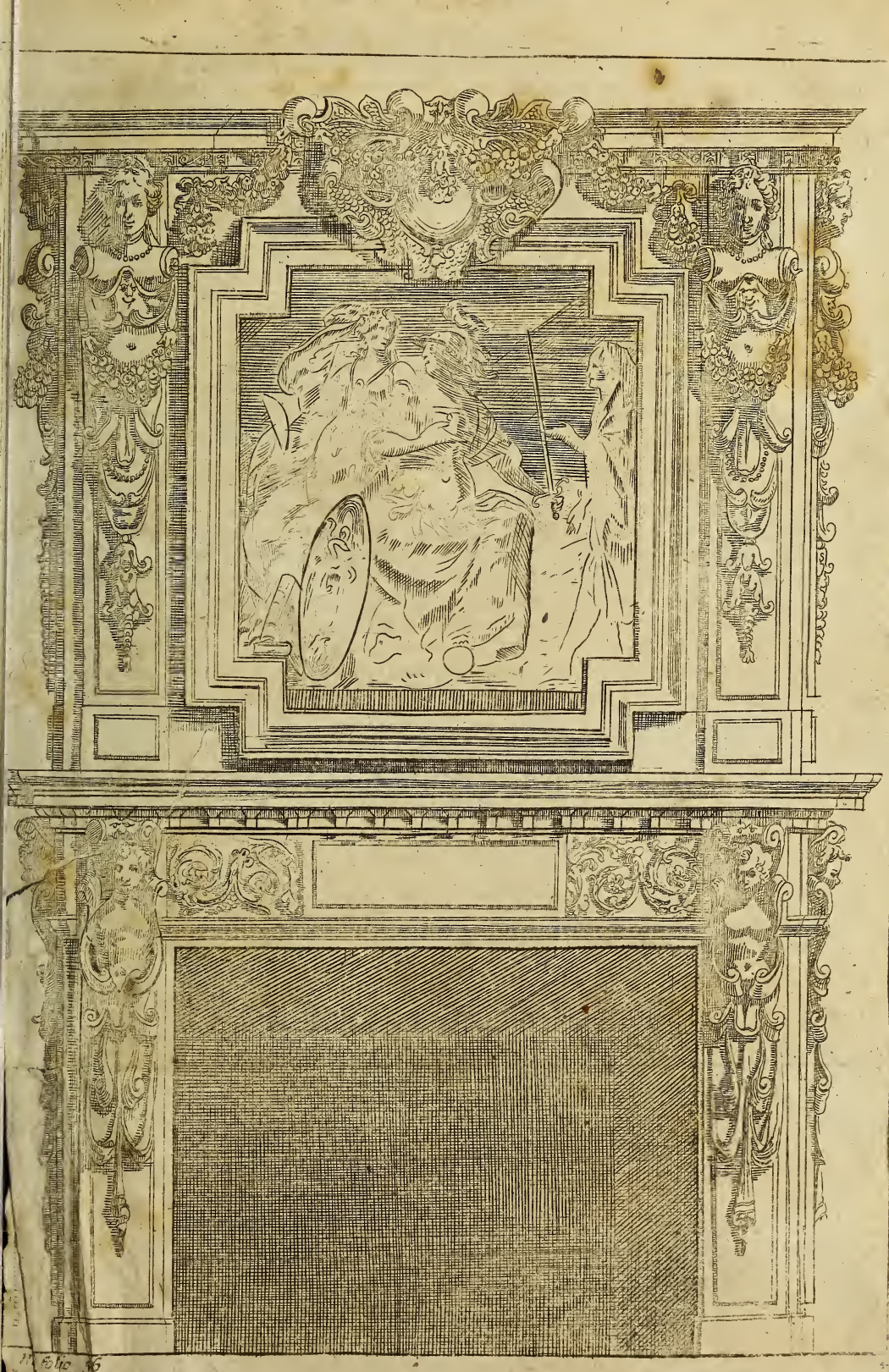

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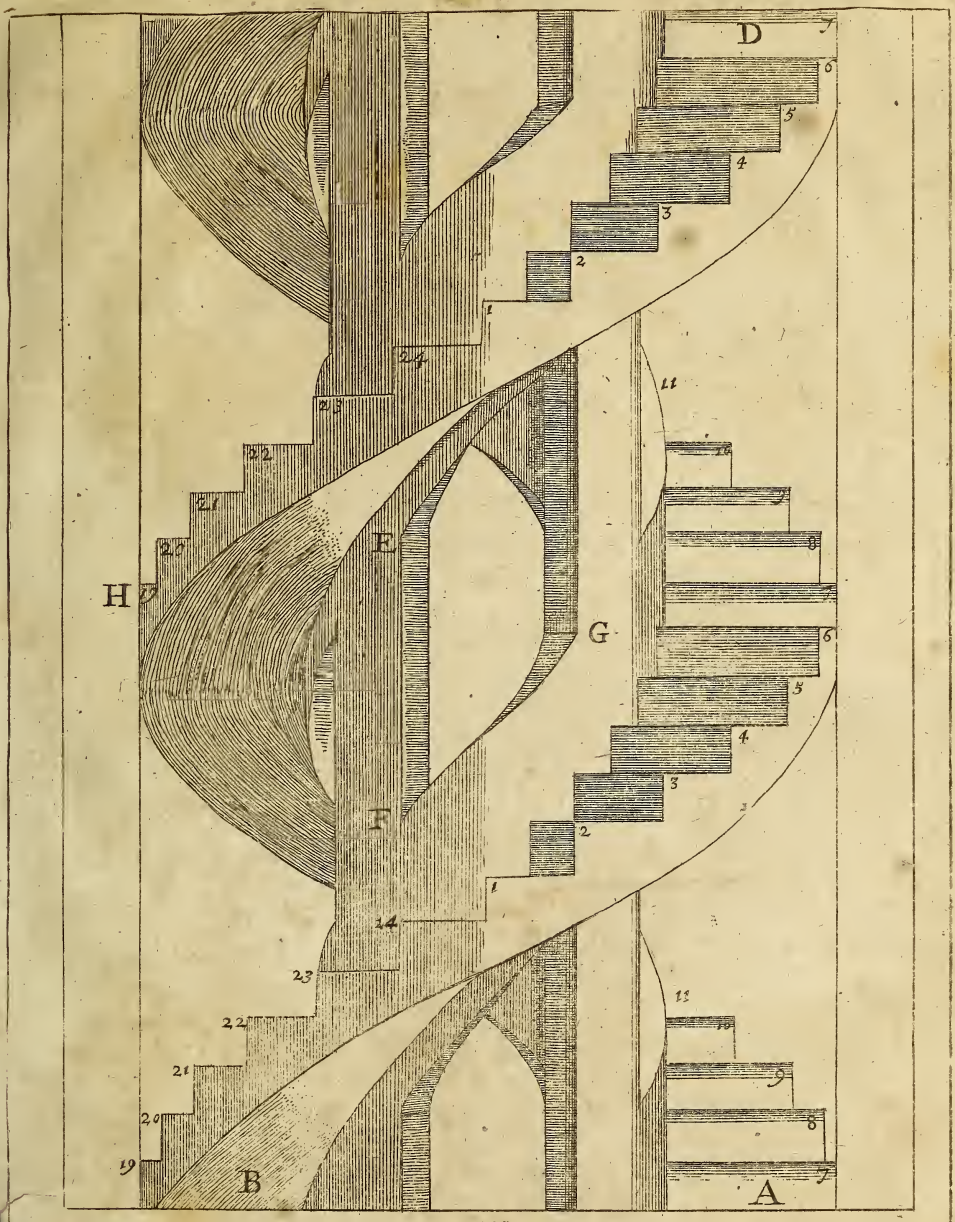

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ARCHITECTIONICE:

OR, A

COMPENDIUM

OF THE

Art of Building.

Giving a Brief Account of the Names, Natures, Qualities, Quantities and Rates of all the Materials belonging to the Erection of any Edifice: And what Quantity of each ſort will be needful for the Building of any Houſe, Great or Small.

Whereby Eſtimates, Valuations and Contracts may be made between Builder and Workman, without any great Damage to either.

And alſo,

How to Meaſure the Works of the ſeveral Artificers belonging to Building; and what Method and Cuſtoms are obſerved therein.

WITH

The Deſcription and Uſe of a Convenient Five or Ten Foot Rod; in taking Dimenſions, and caſting up of the Contents of all Artificers Works. And in the Meaſuring of Angles; whereby the true Ground-Plot of any Building, with Yards, Gardens, *&c.* may be made.

By *WILLIAM LEYBURN.*

LONDON: Printed for *J.* and *B. Sprint*, at the *Bell* in *Little-Brittain.* 1721.

ARCHITECTIONICE: Or a Compendium of the Art of Building, *&c.*

Of Timber, and Carpenters *Work.*

THE *Timbers* moſt uſeful for Building, are *Oak*, *Fir* and *Elm*, but chiefly the two firſt, namely *Oak* for Outſides and Roofs, and *Fir* for Partitions, Doors and Floors: Theſe Timber-Trees ought to be Felled in *Autumn*, and any time of the Winter Seaſon; becauſe then, the Trees recover from the Roots, that ſtrength and ſoundneſs, which in the Spring and Summer, was dilated into Leaves and Fruits. And the beſt time for to Fell Timber for Building, is in the Wane of the *Moon*; becauſe the Moiſture (which is moſt apt to rot Wood) is then conſumed.

Your Timber being Felled, let it be removed to ſome place free from the extremity of the *Sun*'s heat; and alſo from the Wind and Rain.

Timber ought not (eſpecially *Oak*) to be wrought very wet, nor too dry; for too wet makes it more apt to rot, and too dry, more hard to work: And it will not be dry enough to ſaw into Planks for Door-Caſes and Windows, in leſs than three Years.

Timber is ſold by the Load, which contains Fifty Cubical (or Solid) Foot, and each Foot 1728 Cubical (or Solid) Inches. And 20 Solid Foot of Timber, ſawed into ſuch Scantlings as ſhall be hereafter preſcribed, will compleat a Square of 10 (which is a 100 Foot) of the Outſide Carcaſs of an ordinary Timber Building.

For the Price of the Load of Rough Timber fit for Building, it is very uncertain; as from 20 Shillings to 50 or 55 *s.* the Load.

Rough Timber bought for Building, is to be ſawed into ſeveral Scantling; Greater or Leſſer, according to the bigneſs of the Structure therewith to be erected. And the ſeveral Members (or Timbers) belonging to the Erection of any Building whatſoever, are,

Summers, or *Girders*.

Gyſts, or *Joyſts* at full length, to bear in the Wall.

Binding

Binding, Trimming } *Joysts.*
Wall-Plates or *Beams.*
Purlynes, *Principal Rafters* } of *Oak.*
Single Rafters.
Principal Discharges to rest upon *Peers.*

These several *Members* (whether *Oak* or *Fir*) are to be sawed in their Squares, according to their Lengths, as the largeness of the Building shall require: And these Scantlings following, are fitted for all Edifices Great or Small: As

Summers Or *Girders.*
- In Length, from 14 to 16 Foot, must be in their Squares 11 and 8 Inches.
- In Length, from 16 to 20 Foot, must be in their Squares 15 and 9 Inches.
- In Length, from 20 to 25 Foot, must be in their Squares 14 and 10 Inches.
- In Length, from 25 to 26 Foot, must be in their Squares 16 and 12 Inches.
- In Length, from 26 to 28 Foot, must be in their Squares 17 and 14 Inches.

Joysts, at full length (to bear in the *Wall.*)
- In Length, 12 Foot, must be in their Squares 8 and 3 Inches.
- In Length 11 Foot 6 Inches; must be in their Squares 7 and 3 Inches.
- In Length, 10 Foot 6 Inches; must be in their Squares 6 and 3 Inches.

Binding Or Trimming } *Joysts.*
- In Length 7 Foot must be in their Squares 6 and 5 Inches.
- In Length 9 Foot, must be in their Squares 7 and 5 Inches.
- In Length 11 or 12 Foot, must be in their Squares 8 and 5 Inches.

Wall-Plates and *Beams.*

In Length 15 Foot, muſt be in their Squares 7 and 5 Inches.

In Length 16 Foot, muſt be in their Squares 10 and 6 Inches.

In Length 17 Foot, muſt be in their Squares 8 and 6 Inches.

Purlynes.

In Length, from 15 Foot 6 Inches, to 18 Foot 6 Inches, muſt be in their Squares 9 and 8 Inches.

In Length, from 18 Foot 6 Inches, to 21 Foot 6 Inches, muſt be in their Squares 12 and 9 Inches.

Principal Rafters.

In Length, from 12 Foot 6 Inches, to 14 Foot 6 Inches; one ſide cut Taper, from 8 to 5 Inches; and thick on the other ſide 6 Inches.

In Length, from 14 Foot 6 Inches, to 18 Foot 6 Inches; one ſide cut Taper, from 9 to 7 Inches; and thick on the other ſide 7 Inches.

In Length, from 18 Foot 6 Inches, to 21 Foot 6 Inches; one ſide cut Taper, from 10 to 8 Inches; and thick on the other ſide 8 Inches.

In Length, from 21 Foot 6 Inches, to 24 Foot 6 Inches; one ſide cut Taper, from 12 to 9 Inches; and thick on the other ſide 8 Inches and an Half; and thick on the other ſide 8 Inches and a quarter.

In Length, from 24 Foot 6 Inches, to 26 Foot 6 Inches; one ſide cut Taper, from 13 to 9 Inches; and thick on the other Side 9 Inches.

Single Rafters.

In Length, 6 Foot 6 Inches, muſt have in their Squares 4 and 3 and an half, Inches.

In Length, 8 Foot, muſt have in their Squares 4 and a half, and 3 and 3 quarters Inches.

Single

Single Rafters. { In Length, 9 Foot 6 Inches, muſt have in their Squares 5 and 4 Inches.

Principal Diſchargers. { Of any Length, from 10 Foot and upwards (to reſt upon Peers of Wood or Stone, in the firſt Story of Brick-Buildings) muſt have in their Squares 13 and 12, Inches, or 15 and 13 Inches.

The Timber Members for your Building being thus prepared, theſe Rules are to be obſerved in the diſpoſing of them.

1. That no Timber be laid within 12 Inches of the fore ſide of any Chimney Jamb.

2. That all Joyſts on the back of any Chimney be laid with a Trimmer, at 6 inches diſtance from the Back.

3. That no Timber be laid within the Tunnel of any Chimney.

4. That no Joyſts or Rafters be laid at greater diſtance from each other than 12 Inches; and no Quarters at greater diſtance than 14 Inches.

5. No Joyſt ought to bear at longer length than 10 Foot; Nor ſingle Rafters at more than 9 Foot.

6. All Roofs and Frames for Windows ought to be of Oak.

7. No Summers or Girders ought to lie over the Head of Doors or Windows in Brick-Buildings.

8. No Summer or Girder to lie leſs than 10 Inches into the Brick-Wall; nor no Joyſts leſs than 8 Inches.

It is ſaid before, That about 20 ſolid Foot of Timber will compleat one Square; or 100 Foot of the Timber work of any Edifice great or ſmall, that is of the Out-ſide Frame Partitions, the Roof, and the Floors; for Workmanſhip whereof and Timber, it is various, from 15 or 20 Shillings the Square, to 30 or 40 Shillings the Square, according to the goodneſs and largeneſs of the Timbers, and convenience of the Place where it is wrought. And farther Note, That the Framing of the Roof is valued at 4 or 5 Shillings in the Square, more than the Sides, Floors and Partitions.

The Boarding of Floors is a Work diſtinct from the Timber Flooring, and this is meaſured by the Square of 10 Foot alſo, but within the Walls.

Floors for the moſt part are laid with Deal Boards, which are ſold by the Hundred, 120 to the Hundred, at various Prices, according

to

to their length and goodneſs, as from 4 and 5 Pounds to 8, 9 or 10 Pounds, and upwards the Hundred: But for laying of Floors, in Plaining, Joyning and laying the Boards, the common allowance is 4 or 5 Shillings the Square, beſides Nails, of which 200 that is 240, is a competent Allowance.

Of other Carpenter *Works in Houſes, both Great and Small.*

1. *Of Doors.*] Doors made of plain whole Deal, and Rabited, are for Stuff, Nails and Workmanſhip, valued at 3 Pence or 4 Pence the ſuperficial Foot: But double Doors, Battoned and made Wainſcot faſhion, they may be worth 7 Pence the Foot: For the Caſes of ſuch Doors above-mentioned, in the Price of theſe you may riſe or fall at Pleaſure.

2. *Shop Windows.*] Theſe will be afforded at the ſame Rate as Plain or Battoned Doors, beſides the Iron-Work, as Bolts, Staples, Hinges, Locks, Keys, Latches, Chains, *&c.*

3. *Window-Frames.*] Theſe are uſually agreed for by the number of Lights contained in each Frame; ſo that if a Window Frame of Oak ſhould have 6 Lights in it, and be double Rabited it would be worth 18 Shillings; that is 3 Shillings for one Light, for Stuff and Workmanſhip: And the ſame for Frames conſiſting of more or fewer Lights.

4. *Of Stairs and Stair-Caſes.*] An ordinary pair of Stairs, of about 6 or 4 Foot, with Flyers and Windows made of Elm Boards, are accounted to be worth 2 Shillings 6 Pence, or 2 Shillings 8 Pence the Step, for Boards, Wormanſhip and Nails. But if the Materials be found, then 9 Pence and 10 Pence a Step is ſufficient. But for Stair-Caſes, which have an open Newel from the Top to the bottom, with a Landing at every ſixth or eighth Step; and the going being about three Foot and a half all the way: Theſe Stairs, with Rails, Ballaſters, String-Boards, Poſts, Balls, Pendants, and ſuch other Ornaments, may very well be worth 4 ſhillings 6 pence, 5 ſhillings or 6 ſhillings the Step.

There are divers other Timber-Works belonging to ſome Buildings, which are done by the Carpenter, Carver and Joyner, as theſe, *viz.*

Door and Door-Caſes, with their Ornaments; Chimney-Pieces, and their Ornaments; Outſide Doors and Door-Caſes; Cornices and Guttering; Cantaliver and Modellion; and plain Cornices; Pediments over Doors; Spurs, Peers, Pilaſters, *&c.* Of theſe ſome are valued by the Piece, Dearer or Cheaper according to their largeneſs, goodneſs of the Stuff, and Curioſity in Workmanſhip: Others are meaſured

measured and rated by the Foot running Measure; of which more hereafter.

Of Bricks, and Bricklayers Work.

BRricks are made of Reddish Earth, which ought to be digged before Winter, but not made into Bricks 'till the Spring-Season. The Goodness of Brick-Earth is various, and the well ordering of it as uncertain.

In every Brick-kiln (or Clamp) are Three sorts of Bricks: Those next the Fire are best burnt, and such as have naturally much Nitre, or Salt-Petre in them, will, with the violence of the Fire run, as if glazed over: And this sort, some call *Clinkers*. The next to these in the Kiln, or Clamp, are best for general Uses. The outermost in the Clamp are the *worst*; where the Salt-Petre is not digested for want of heat; and these will molder away like Dirt, with the least moisture: And this sort they call *Samel* (or *Sandal*) Bricks. And it is observable; That, while Bricks are burning, that side of the Clamp next the Wind are the worst of all; the heat being driven from thence.

Bricks are sold by the Thousand, which makes two Load.

The general Rates for making of Bricks, is 4 *d.* 5 *d.* or 6 *d.* the Thousand, for the Moulder only; and a days Work is commonly 9000; but a dextrous Workman will make about 14 or 15 Thousand in a Day.

The Moulds, in which Bricks are moulded (or made) ought to be (by the Statute) within, in length 9 Inches, in breadth 4 Inches and a half, and in depth 2 Inches and a quarter. Bricks made in such a Mould (the Earth being first well tempered) dried and burnt, they will be less and lighter; yet they shrink in thickness but little, in breadth less, and in their length not discernable. The weight of Bricks is uncertain; the ponderosity of Earths being uncertain; yet commonly one Brick will weigh above 5 Pound; and will contain in solid Measure, 90 Cubical Inches, and from some Moulds 100. And these Bricks (one with another) laid in Morter, and well jointed, 13 of them will make a *Quine*, *Peer*, or *Pedestal*, one Foot solid, or equal thereto in solid Measure.

A Wall of one Brick and a half thick, with the Joynt, will be in thickness 14 Inches or very near; and in this, according to the forementioned Proportions, 150 or 160 Bricks will lay a *Yard* square, measured upon the Face of the Building; and to the Square of Ten Foot (which is 100 square feet) usually are allowed 700 or 1800 Bricks; and 4600, or 5000 Bricks, will compleatly lay, erect or build

build one Rod, Pole or Perch ſquare: Which Rod, Pole or Perch contains in length (according to the Statute) 16 Foot and a half; whoſe ſquare is 272 Foot and a quarter, ſuperficial Meaſure, which is 30 Yards and a quarter.

I have herein delivered Numbers, according to each Quadrat or Quantity; becauſe in this there can be no exactneſs diſcovered; and that for ſeveral Cauſes (altho' from one and the ſame Mould and Clamp) as the Bricklayer's Hand and Morter may vary: Many Bricks are warp'd in Burning; ſome miſcary in every Load, or 500 Bricks. The Tally or Tale (for the moſt part) too little, if not well look'd after: And beſides all theſe Uncertainties, when *Bricks* are *dear*, and *Lime cheap*, the Workmen (by the Great) will uſe more Morter, and make the ampler *Joynts*, which is much worſe for the Building.

Theſe things being conſidered; when all Materials are ready, a Workman with his Labourer, (in whole Work upon a ſolid Plain) will lay in one day 1000 Bricks, and ſome 12 or 1500.

The Value of Bricklayers Task work is various, according to the Place and charge of the Materials; the Rates being uncertain every Year. But,

In New Work five Pound, or five Pound ten Shillings the Rod ſquare, (or 272 Foot ſuperficial Meaſure upon the face of the Wall) is uſual.

Or two Pound ten Shillings the Rod, and the Bricks laid in at the Builder's Charge.

But to erect new Structures, by taking down old Walls; it may be worth three Pound, or three Pound ten Shillings the Rod ſquare: For that in taking down the Walls, and clearing of the Bricks, there is much time ſpent, and alſo more Morter uſed in laying them again, than in New Work.

All Brick-Work (according to theſe Rules and Rates) are ſuppoſed to be 14 Inches (or one Brick and half) thick, which is the Standard thickneſs. ——If they be thicker or thinner they muſt be reduced to that thickneſs, as ſhall be taught how to do, when we come to treat of Meaſuring of Brick-work.

But, (in the mean time) note, That in Buildings that are not above two Stories with the ground Room, and not exceeding 20 foot to the Rayſon-Plate, and upon a good Foundation, the length of two Bricks or 18 Inches for the Heading Courſe, will be ſufficient for the Ground-work of any common Structure; and 6 or 7 Courſes above the Earth, to a Water-Table, where the thickneſs of the Walls are abated (or taken in) on either ſide the thickneſs of the Brick, namely two Inches and a quarter.

But

But for large and high Buildings, of three, four or five Stories with the Garrets: The Walls of ſuch Edifices ought to be, from the Foundation to the firſt Water-Table, three Heading courſe of Bricks (or 28 Inches) at the leaſt; and at every Story a Water-Table, or taken in on the inſide for the Summers and Joyſt to reſt upon, laid into the middle, or one quarter of the Wall at leaſt for the better Bond. But as for the innermoſt or Partition Walls, one Brick and half will be a ſufficient thickneſs: And for the upper Stories a nine Inch or (Brick at length) Wall will very well ſuffice.

The Rate and Price of Bricks by the Thouſand is very uncertain, in reſpect of Workman's Wages, the convenience of Carriage, and the Price of Fuel to burn them with: But I never did know them cheaper than 9, nor dearer than 18 ſhillings the Thouſand, delivered in any Port of *London*: And at this time Bricks made at home, will ſtand the Marker of them (beſides his Ground) for digging, molding, Straw and Fuel to burn them in, between 5 and ſix ſhillings the Thouſand.

Chimneys in Buildings, are ſometimes meaſured and paid for by the Rod, as other Brick-work is; or elſe paid for by the Fire-Hearths, at ſo much a Fire-Hearth, which is various, as from 20 to 50 ſhillings the Hearth.

Of Laths and Lathing for Tyling.

LAths for Tyling ought to be heart of Oak, of which the Statute approves of two ſorts, the one of 5, the other of 4 Foot in length, and ſold by the Bundle, not differing in Price or Quality, but in Quantity, the longer ſort having but five ſcore to the Hundred, the ſhorter ſix ſcore.

To the longeſt Laths, 500 Lath-Nails is the common Allowance, and to the ſhorter 600, that is 720 Nails to each Bundle of Laths, ſix ſcore to the Hundred, and ten Thouſand Nails to a Sum, in Number 12000. One Bundle of the longeſt Laths extended makes 500 Foot, the other 480. Every of theſe Laths ought to be in breadth one Inch, and a half, in thickneſs half an Inch, but are uſually leſs, and never exact, either in their Tale or Meaſures. Both theſe ſorts of Laths are neceſſary, becauſe all Rafters are not ſpaced alike, nor yet the Proportions ſtrictly obſerved in every one and the ſame Roof.

Of Laths there are three kinds; namely, Heart of Oak, Sap-Laths and Deal-Laths; from one ſhilling, to 2 ſhillings ſix pence the 100, or Bundle. The two laſt ſorts are uſed for Cieling and Partitioning; and the firſt for Tyling only.

The Proportions for the Tyler's Lathing is various; as ſometime 3 inches and a half, ſometimes 4 inches; and in both, there ought to be a Counter-Lath between every two Rafters: To every Thouſand of Tyles is allowed uſually one Peck of Tyle Pins, from 2 ſhillings to 4 ſhillings the Buſhel. —Four Buſhels of Lime, and 6 or 8 Buſhels of Sand will make Morter ſufficient to lay 1000 Tyles: And ſixty Tyles will cover one ſquare Yard at a ſeven inch Gauge, and 12 foot ſquare (which is 144 foot) will require near 1000 Tyles: But the ſquare of 10 foot (which is 100 foot) and the uſual Meaſure for Tyling in Task-Work, will require but 660 or 666 Tyles: And commonly one of theſe Squares is accounted a days Work. ——Moreover, the Barge Courſes, and Gable Ends of all Buildings, ought to be ſtruck with Lime and Hair-Morter, to prevent the Wind from ripping up the Tyles.

Of Tyles.

TYles are of ſeveral ſorts, but all made of the ſame Earth, but better than Brick Earth, and ſomething near the Potters-Earth. According to the Statute of 17 *Edw.* 4. *Cap.* 4. Earth for Tyles ſhall be caſt up before the firſt of *November*, ſhired and turned before the firſt of *February*, and not made into Tyle before the firſt of *March*, and ſhall likewiſe be tried and ſevered from Stones, Marlne, Marle and Chalk.

Of Plain Tyles.

By the fore mentioned Statute, a Plain Tyle ſhall contain in length ten inches and a half, in breadth ſix inches and a quarter, and in thickneſs half an inch and half a quarter at the leaſt. One of theſe Tyles will contain in ſuperficial Meaſure 65 inches, in ſolid Meaſure 48 inches; and one of them will weigh about 2 Pounds and a half: One Thouſand of theſe Tyles go to one Load. And for the making of 1000 of theſe Tyles 2 ſhillings, and 2 ſhillings ſix Pence is a uſual Price; but the price of 1000 Tyles is various.

Of Roof or Ridge Tyles.

Theſe Tyles are made of the ſame Earth as the Plain Tyles, and one of them (by the fore-mentioned Statute) ſhould contain in length thirteen inches, and in thickneſs the ſame with the Plain Tyles, in ſome places, 5, 6 or 7 of them are allowed into every thouſand of Plain Tyles: But if bought by themſelves, they are ſold at 20 or 25 ſhillings the Hundred. Their form are like unto a Pannel, and their breadth between the Points 8 or 9 inches.

Of

Of Gutter-Tyles.

Beſides theſe, there are other Tyles made properly for Gutters in Croſs-Buildings, in Vallys, and gather'd Ends, *&c.* They are in the form of Triangles, Circular at their Bales, they are about 10 inches deep. There are Corner-Tyles alſo, which are more flat than the other, and rounded off at the upper Angle, to lie the better and cloſer on the Sleeper; they have Pin-holes in them at their Acute Angle. Theſe are uſually ſold at two Pence or three Half-pence the Tyle, or for between 10 and 15 ſhillings the 100.

Of Crooked, Pan or Flemiſh-Tyles

Theſe Tyles are uſed in covering of Shades, Lean-too's, and all kind of flat Roof'd Building. Theſe Tyles are for the moſt part laid dry, without any Morter; yet ſometimes pointed within-ſide.

Theſe Tyles are uſually in length 14 inches and a half, in breadth 10 and a half. The Laths whereon they hang, by a knot of their own Earth, are 10 or 12 foot in length, in breadth one inch and a half, and in thickneſs one inch. Theſe Laths are uſually ſold at 2 Pence or 3 Pence the Lath, or at 10 or 13 ſhillings the 100.

The Gauge for nailing theſe on with Four-penny Nails, is 10 inches and a half; their breadth when laid 8 inches. One Lath ſerves for one Yard ſquare of Tyling; and 150 Tyles and 10 Laths will cover one Square, (or 100 Foot) of this kind of Tyling.

A great covering of theſe ſpends but little Morter (if pointed) and but little time in laying. The price of theſe Tyles in moſt places is about 7 or 8 Shillings the 100.

Of Lime, Sand, and Morter.

STones whereof Lime is made, are either digg'd out of the Hills, or taken out of the Rivers: That Lime muſt be beſt which is made of the hardeſt, ſound and white Stone; and being burnt, remains a third part lighter than the Stone. All digg'd Stones are better to make Lime than gathered Stones, and from a ſhady and moiſt Pit than from a dry. All Stones are ſooner or later burnt, according to the Fire which is given them; but ordinarily they are burnt in three-ſcore hours. Stones being burnt, wet them; but pour not all the Water on at once, but at divers times, and frequently (that they may not burn) 'till they be well tempered. Afterwards, put them in a moiſt and ſhady place without any moiſture, only cover them lightly with Sand; and by how much the more they are ſteeped, ſo much the more tough and better they will be.

Of Sand there are three ſorts; that is to ſay, Pit-Sand, River-Sand, and Sea-Sand; Pit-Sand is, of all, the beſt: Of all Pit-Sand the White is the worſt; and of River Sand, that from the Stream, which is found in the Falls of Water is the beſt, becauſe it is moſt purged: The Sea-Sand is worſt of all. The Pit-Sand, becauſe it is fat and tough, is therefore uſed in Walls and Vaults. The River-Sand is very good for covering or rough-caſting of Walls. All Sand is good in its kind, if being ſqueeſed and handled it crakles; and if being put upon a white Cloath, it neither ſtains nor makes it foul. That Sand is bad, which mingled with Water, makes it dirty and muddy; and which hath been a long time in the Air; becauſe it will retain much Earth and rotten humour.

For to make Morter, you muſt ſo mix the Sand, that taking of Pit-Sand, you muſt put three parts thereof to one of Lime: If River or Sea-Sand, two parts to one of Lime will be ſufficient.

The common allowance for Lime is, one quarter, or eight Buſhels heap'd meaſure, to every Thouſand of Bricks; or One hundred and a half to a Rod ſquare. One hundred of Lime is in many Places 25 Buſhels, valued from 8 to 12 Shillings; to which, the uſual Allowance for Morter, is two Load of Sand, and that at one Shilling, or one Shilling and Six-pence the Load bringing in: And for digging a Cubical Yard Four-pence or Six-pence.

Of Slate and Slating.

COvering with Slate is very neat, eſpecially the blue Slate, cut into long Squares or Scallops, and uſual in Summer and Banqueting-Houſes in Gardens: But as this Covering is neat and handſom, ſo alſo it is very chargeable; for Roofs covered with Slate muſt be firſt Boarded over, the Slates hang'd upon Tacks, and laid with finer Morter than Tyles.

This kind of Covering with Slate, is valued by ſome from 3 to 6 ſhillings the Yard ſquare; or by the ſquare of 10 Foot (that is 100 Foot) at one pound ten ſhillings, at two pounds five ſhillings, and at three pound the Square (or more) in ſome places.

But if theſe Slates be rudely cut and careleſly laid (in reſpect of Form) it is than accounted a cheaper Covering than with Plain Tyles eſpecially in thoſe Countries where the Earth affordeth plenty of them.

Of Shides or Shingles.

SHingles, called alſo Slate or Shides of Wood, are quarter'd Oaken Boards, ſaw'd to a certain Scantling, but uſually rift about an Inch thick at one end, and made like Wedges about 4 or 5 Inches in breadth,

breadth, and 8 or 9 Inches long. This kind of Covering is very chargeable, and seldom used, but in covering of the Roofs of Churches, and Pyramidal Steeples.

For the Covering with these, first, they must be well boarded over; that done, the Shingles are fastened to those Boards with four-penny or six-penny Nails in every Course, at a certain Gauge; as admit four Inches from under one another. Then supposing the Shingle four Inches broad, and laid at four Inches Gauge, the Square is 16 Inches; by which divide 1296 (the Number of Inches in a square Yard) the Quotient will be 31, the number of Shingles allowable to every square Yard of Covering; and the like Number of Nails will serve to tack them on.

Of Lead.

OF Lead there are three sorts; White, Black and Ash colour: The White is more perfect and precious than the Black; and the Ash-colour between both. Lead is digg'd either in great Lumps, found by themselves, or in small pieces which shine with a certain blackness, or else in very thin Fleaks amongst the Rocks. All sorts of Lead will easily run, because, with the heat of the Fire it melts before it be red-hot; and put it into a very hot Furnace it loseth its Nature and Strength; for one part is changed into Litharge, and the other into Dross. Of these sorts of Lead, the Black is soft, and therefore easile wrought with a Hammer or Mallet: It dilates much, and is very heavy: The White is harder and lighter: The Ash-colour is much harder than the White, and of middle weight between both.

Covering with Lead is the most Magnificent, and is generally used for the Covering of Churches, Princes Palaces, Castles, and Great Men's Houses. It is generally laid almost flat to walk upon, allowing the Water a little Fall to the Battlements, thence privately to descend in Pipes.

This Material is often used for Gutters in ordinary Tyled Buildings, to conduct the Water from the House unto some convenient place to fall into: And Sheets of Lead for this service are always run the thinnest, being more Pliable for the Plummer. Every square Foot of such Lead is valued to weigh 6 or 7 pound if old, 8 or 9 pound a Foot if New: But as for the other Sheets for Covering, each square Foot is estimated to weigh 8, 9, 10 or 11 pound if old, and 11 or 12 pound the Foot square if new, and if very good; and 112 pound, or one hundred Gross will cover one Yard: Or 9 Foot square.

The

The worth of Lead in Piggs is uncertain; as from 10 to 20 ſhillings the Groſs Hundred, that is from 10 to 20 Pounds the Tun: But in Exchanging of old Lead for Sheets new run, there is commonly allowed 3 ſhillings in every Hundred weight Groſs, for Waſte and Workmanſhip.

Covering with Lead is valued at 13, 14 or 15 ſhillings the Yard ſquare; or between 7 and 8 Pound the ſquare of 10 foot, beſides Sawder, at 9 Pence or 10 Pence the Pound weight, as it is allay'd with Lead, and Seal'd: For Tin is 10, 11 or 12 Pence the Pound Neat.

Of Iron.

IRon is no where found and digg'd pure; but when digged it is purged by Fire, to the end it may be ſo melted, that it may run; ſo that before it be cool, the foulneſs may be taken away: But after it is purged and cooled, it heats well, and becomes ſoft and eaſy to be wrought, and beat out with the Hammer; but it will not eaſily melt. It is a ſign of the goodneſs of Iron, if in the Maſs, you ſee the Veins continued ſtreight without interceptions; and if the ends of the piece be clean and free from ſoil; becauſe the ſaid Veins ſhew if the Iron be without Knots and Puffs: Thus may you underſtand the middle by the ends: But being wrought into Plates, either ſquare or other form, if the ſides be even, you may conclude it to be all alike good, the Plate having equally endured the Hammer.

The Uſes of this Metal in Building are many; for of it are made Nails, Hinges, Door-Chains, Doors, Grates, Dogs, Hangers for Signs, Balconies, *&c.*

This Metal being wrought by the Smith into Dogs, Iron-Bars, Staples, large Hooks and Hinges, Grates, *&c.* The uſual Rate is 3 Pence half-penny, or 4 Pence the Pound. But for ſmall and neat Hooks, Hinges, Bolts, Staples, *&c.* various, as from 4 Pence to 8 Pence the Pound.

Caſements are not uſually made by the Pound weight, but valued according to their bigneſs, largeneſs, ſtrength and goodneſs of their Locks, as from 3 ſhillings to 20 ſhillings the Caſement.

Diverſe other Works about Building are made of Iron, as Locks and Keys, Balconies, Gates, Sign-Irons, all whoſe Prices are as various as they can be made in ſubſtance, goodneſs and neatneſs.

Of Pargetting.

PArgetting or Plaiſtering is of divers kinds. As, (1.) With Lime and Hair-Morter laid upon bare Walls, at 3 Pence or 4 Pence the Yard.

Yard. (2.) Upon bare Laths, as in partitioning and plain Cielings, from 8 Pence to 14 Pence the Yard ſquare. (3.) Rendring in Partitions, at 2 Pence or 3 Pence the Yard. (4.) Rough caſt upon Heart-Laths, from 1 Shilling to 3 Shillings the Yard ſquare. (5.) Plaiſtering upon Brickwork, with finiſhing Morter, in imitation of Stone-work, from one Shilling to 18 Pence, or 2 Shillings the Yard ſquare, or more. (6.) And the like upon Heart-Laths, at 18 Pence, 2 or 3 ſhillings the Yard ſquare.

In all theſe Works, the Scaffolding is to be conſidered; and the quantity of Limbe and fine Sand for finiſhing Morter muſt be equal.

Of Priming, or Painting of Outſide-works.

PAinting of Outſide-works; as Doors, Shop-Windows, Window-Caſes, Pediments, Architraves, Frizes and Cornices, and all other Timber-works which are expoſed to the Weather, ought at firſt ſetting up to be primed with Spaniſh Brown, Spaniſh White, and Red Lead (about a 5th part) to make the other two Colours to dry, well grown'd with Lintſeed Oyl, will make excellent Primer: Then afterwards with the ſame Colour (but much more whiter) for ſecond Primer; and laſtly, with fair white, made of White Lead, and about a fifth part in quantity (not in weight of Spaniſh White.

Outſide-Work thus coloured, may be afforded for 3 Pence, or 3 Pence half-penny the Yard ſquare, for every time laid over.

Window-Frames of 2, 4 or 6 Lights, are not uſually meaſured, except they be very large; but valued at 3 Pence, 4 Pence and 6 Pence a Light; and every Caſement at three half-pence or 2 Pence the Caſement; and Iron Bars at 1 Penny, or more, if very large.

Of Glaſs, and Glaſing.

GLaſs, when melted, is run into Tables; thoſe in *England* of equal ſize, containing about 5 ſquare feet; five and forty of theſe Tables are called a Caſe of Glaſs, which weighs about two hundred Pound weight. The Price uncertain; as from 30 to 40 ſhillings the Caſe: And to cut one Caſe into Quarries Diamond faſhion, with halves and quarters, will be worth 6 or 7 ſhillings. Theſe Quarries, for the moſt part are ſix inches in length from one Acute Angle to the other, and in breadth from Obtuſe Angle to Obtuſe Angle 4 inches; ſo that each Quarrie contains 12 ſuperficial inches: For Glaſing with theſe Quarries, Lead, banding and ſetting up, the Joynts ſawdered, and Caſements pinned, being included the uſual Rate is about 5 Pence the foot Square.

Nor-

Normandy, or French Glaſs, is much thinner, clearer, and more tranſparent than Engliſh Glaſs: This Glaſs is much dearer, as quantity for quantity, for there are but Twenty-five Tables in a Caſe.

This French Glaſs is, for the moſt part cut into long Squares, not only for common Windows, but for Saſh-Lights alſo; which are much dearer than the Glaſing with Lead.

Of Paving, the ſeveral ſorts thereof.

PAving with Rough or Rag-Stone is the cheapeſt of all Pavements; valued from 12 pence to 15 pence the Yard.

Paving with Pebble-Stones laid in Gravel; for Materials and Workmanſhip may be worth 15 or 18 pence the Yard ſquare.

Paving with common Brick. This kind of Paving is uſual for Cellars, Waſh-houſes, Sinks, Fire hearths, and ſuch like: Of Bricks, 30 of them (if made by the Statute) will pave 1 Yard ſquare.

Paving with Flemiſh Brick. The Paving with theſe Bricks is far neater and ſtronger than common, or Clay Bricks: They are of a yellowiſh Colour they muſt be laid in Sand: Each Brick is 6 Inches and a quarter long, 2 inches and a half broad, and 1 Inch and quarter thick: Now allowing one quarter of an Inch for the Joynt; then 72 of them will pave a Yard ſquare; but if they be ſet edg ways, then to pave a Yard ſquare, will require one hundred Bricks. —Theſe Bricks are uſually ſold at 2 ſhillings the 100, and 4 pence, 5 pence or 6 pence the Yard ſquare for laying them.

Paving with ſquare Tiles: Theſe are made in Moulds as Bricks are, and are of ſeveral ſizes, *viz.* 6, 8, 10 and 12 Inches ſquare, in value, from 6 ſhillings to 20 ſhillings the hundred; and to know how many of either of theſe ſorts of Tyles will pave any Pavement.

Note that { 36, 21, 13, 9 } Tyles of { 6, 8, 10, 12 } Inches ſquare, will pave one ſquare Yard.

Paving with broad Stone, taken out of Quarries (commonly called Free-Stone) and cut into Lengths and Breadths promiſcuouſly, and in thickneſs about 2 or 3 Inches. This kind of Paving is laid in common Yards and Paſſages, before Shop-Doors and Stalls, *&c.* and is worth for the Stone fitting, and laying in Morter about 6 pence, 7 pence or 8 pence the Foot ſquare, or 4 ſhillings 6 pence 5 ſhillings 3 pence, or 6 ſhillings the ſquare Yard. Some there are of theſe Stones cut perfectly ſquare, as Paving Tyles are, but much bigger, as 18, 20, 24 Inches ſquare, and upwards: But theſe, as they are neater, ſo they

are

are dearer; ſome Pavings with theſe, being worth 12 Pence the Foot, or 9 Shillings the Yard ſquare; but 15 or 16 Pence the Foot, if the Stones be good and well polliſhed, as they ought to be for Kitchens, Daries, and neat private Places.

Paving with (Rigate) commogly called Fire-Stone; is good for Chimney Fire-Hearths, Ovens, Stoves, *&c.* And this is ſomewhat dearer than common Purbeck Pavement.

Paving with Marble, is of all other the moſt beautiful; of which there are ſeveral ſorts, as White, Black and Gray: Some Pavements (as in Foot Paces before Chimnies) are, laid all of one ſort or colour, and in one entire Stone, others of two Colours laid ſquare, or Chequer-wiſe, the ſide of one by the ſide of the other; others are laid Arrace-wiſe of two Colours, laid Angle to Angle; and this laſt is the neater: But there may be diverſe Forms contrived to lay them in. As you may ſee in ſeveral Chancels, in the Quire of St *Paul*'s Cathedral, and in the *Royal Exchange* in *London*, and divers other Places: This kind of Pavement is valued from 2 Shillings to 3 Shillings the Foot ſquare, and upwards, according as it well laid and polliſhed.

How to meaſure the Works *of the ſeveral* Artificers *relating to the* Building *of any* Edifice, *Great or Small.*

THE *Artificers* relating to *Building*, are, (1.) The *Bricklayer*, (2.) The *Carpenter*, (3.) The *Plaiſterer*, (4.) The *Painter*, (5.) The *Glaſier*, (6.) The *Joyner*, (7.) the *Maſon*: And all their Works are meaſured, either with a *ten* or *five Foot Rod*, and a *two Foot Rule*, and ſometimes with a *Line*; (but beſt of all by ſuch a *ſliding Rod* of 5 or 10 Foot, as is deſcribed and treated of at the end of this Book) and the *Dimenſions* ſo taken are ſet down in *Feet*, *Inches*, and *quarters* of *Inches*: And when ſo taken and caſt up, thoſe *Feet* and *Inches*, and *parts of Inches* (if any be taken in your meaſure) muſt be *reduced* into *Rods*, *Poles*, or *Perches*; into *Squares* of 10, that is, into 100 *ſuperficial Feet*; into *Yards* or 9 *ſuperficial Feet*; into *ſingle ſuperficial Feet*: And ſome Works are meaſured by their *length* in *Feet* only (commonly called *Running Meaſure.*) Now when any *Dimenſion* taken as before, and ſet down in *Feet*, *Inches*, and *quarters* of *Inches*. It will be neceſſary to ſhew how to *reduce Inches* and *quarters* of *Inches* into *Decimal parts* of a *Foot*: And for the ready Performance thereof, you are to note, That *one*, *two* or *three Inches*, &c. is the *one twelfth*, *two twelfths*, *three twelfths*, &c. of a *Foot*. —And that *one quarter* of an *Inch*, *two quarters* of an *Inch*, &c. is the *one forty eight*, *two forty eight Parts* of a *Foot*; ſuch as the whole *Foot* contains 100: And ſo of

any other Number of *Inches* and *quarters* of *Inches*; and what *Decimal* or *Centesimal* Number doth represent any Number of *Inches* and *quarters* of *Inches*, this small *Table* following doth plainly shew.

A Table, shewing what Decimal Number doth represent every Inch and quarter of an Inch, in one Foot.

100 *Parts of a Foot.*		*One quarter of an Inch.*	*Two quarters, (or half) an Inch.*	*Three quarters of an Inch.*
Inches.	100 *Parts of a Foot.*	100 *Parts of a Foot.*	100 *Parts of a Foot.*	100 *Parts of a Foot.*
0	.00	.02	.04	.06
1	.08	.1	.12	.14
2	.16	.18	.2	.22
3	.25	.27	.29	.31
4	.33	.35	.37	.39
5	.42	.44	.46	.48
6	.5	.52	.54	.56
7	.58	.6	.62	.64
8	.66	.68	.7	.73
9	.75	.77	.79	.81
10	.83	.85	.87	.9
11	.92	.94	.96	.98
1 Foot.	100			

How to set down any Number of Feet, Inches, *and* Quarters *of* Inches *in a* Decimal Fraction.

Suppose you had taken the Measure of the *Length* or *Breadth* of any thing, and found it to be 27 foot 9 Inches and 3 quarters of an inch.

To set this down in a *Decimal*, you must first set down the 27 Foot making a Point, Prick or Comma after it in this manner, 27. then look in this first Column of the Table towards the left hand for 9 Inches, and at the head of the Table for 3 quarters of an Inch, and against 9 Inches, and under 3 quarters of an Inch you shall find .81, which set after 27. Foot, which will make it 27.81 which is the *Decimal* representing 27 Foot 9 Inches and 3 quarters of an Inch; and in the same manner you may find, That 32 Foot

32 Foot 7 Inches, must be set down thus——————32.58
426 Feet 3 Inches 2 quarter, thus——————426.27
61 Foot 1 Inch and a quarter, thus——————61.01
3 Feet 11 Inches and a half, thus——————3 96

And the like of all other Numbers; as in the Table plainly doth appear.

This Table ought to be learned by heart, as the Table of *Multiplication*, but may be more easily effected if you remember that .08 parts is 1 *Inch*, .16 parts 2 *Inches*, .25 parts is 3 *Inches*, &c. and also, that .02 parts is 1 quarter of an *Inch*, .04 is half an *Inch*, .06 is 3 quarters of an *Inch*; then is .08 1 *Inch*, 1.1 is 1 *Inch* and a quarter, 1.12 1 *Inch* and a half, *&c.*

How to Multiply Feet, Inches; and quarters of Inches, by Feet, Inches and quarters of Inches.

Examp. 1. Let it be required to Multiply 232 Foot 9 Inches by 72 Foot 6 Inches.

The *Decimal* of 232 Foot 9 Inches——————232.75
The *Decimal* of 72 Foot 6 Inches——————72.5

116375
46550
162925

The Product——————16874.375

Multiply 232.75 by 72.5 as in common *Multiplication* the *Product* will be 16874.375, from which cut off 3 Figures to the right hand (because there were 3 places of parts in the two given Numbers) and it will be 16874.735, which is 16874 Foot, 4 Inches and a half; the 37 (rejecting the 5 as superfluous) being the *Decimal Part* of 4 Inches 2 quarters, as in the Table you will find it to be.

Examp. 2. Let it be required to Multiply 23 Foot 7 Inches and a half, by 9 Foot 3 Inches and one quarter.

The *Decimal* of 23 Foot 7 Inches and a half, is 23.62, and the *Decimal* of 9 Foot 3 Inches and a quarter is 9.27; these two multiplied together, the Product will be 218.9574, from which cut off four Figures towards the right hand, (for the four Figures of parts in the given Number) and the *Product* will be 218.9574, as in the Margin; which is 21 8 Foot 11 Inches and a half.

23.62
9.27

16534
4724
21258

218.9574

Examp. 3. Multiply 406 Foot 5 Inc. and a quar by 9 Inc. a quar.

406 44
.77
284508
284508
312 9588

The *Decimal* of 406 Foot 5 Inches and a quarter, is 406.44; and the *Decimal* of 9 Inches and a quarter, is .77; these multiplied together, their Product is 312.9588, from which four Figures being cut off, it will be 31 Foot 11 Inches and a half.

Other Examples ready wrought.

(1.) 16 Foot 3 Inch. and a quar. by 7 Inch. 3 quar.
(2.) 46 Foot 11 Inches 1 quart. by 14 Foot.
(3.) 9 Foot 11 Inc. and 3 quar. by 9 Foot 11 Inc. and 3 quarters.

(1)	(2)	(3)
16.27	46 94	9.98
.64	14	9.98
6508	18776	7984
9762	4694	8982
		8982
10.4128	657.16	99.6004
10 F. 5 In. *fere*,	657. F. 2 Inch.	99 F. 7 $\frac{1}{4}$ Inch.

Note: If it be objected, that there are more Figures used in this *Decimal* way of *Multiplying*, than in *Multiplying Feet* and *Inches* by *Cross Multiplycation*: I Answer; First, In this way *Division* is wholly omitted, which would require many Figures not here set down: And Secondly, *Feet*, *Inches*, and *Parts* of *Inches*, are multiplied by *Feet*, *Inches*, and *Parts* of *Inches*, as easily (and with the same number of Figures) as *Feet* and *Inches* only are; and all without any *Division*. And Thirdly, though there be 3 or 4 Figures in the *Product* cut off, the two first of them are sufficient for any occasion.

A Comparative *Example*, between *Cross-Multiplication* and this way by *Decimals*.

Let it be required to multiply 5 Foot 3 Inches and a half, by 2 Foot 4 Inches and a half.

I. *By Croſs-Multiplication.*

	F.	In.	12 Par.
Set down the Numbers thus,	05	3	6
	02	4	6
1.) Multiply 5 Foot by 2 Foot, it makes 10 Foot, which ſet under Feet	10	0	0
2.) 2 times 3 Inches is 6 Inches, which ſet under Inches	00	6	0
3.) 5 times 4 Inches is 20 Inches, or 1 Foot 8 Inches, which ſet under Feet and Inches	01	8	0
4.) 4 Inches by 3 Inches is 12 parts, or one Inch, which ſet under Inches	00	1	0
5.) Multiply the Parts into the Feet, ſaying 6 times 2 is 12, or one Inch, which ſet under Inches	00	1	0
6.) 6 Parts by 5 Foot makes 30 Parts, and that is 2 Inches and 6 Parts, and theſe ſet under Inc. and Parts	00	2	6
7.) Multiply 6 Parts into 3 Inches it makes 18 Parts, or 1 Part and a half, the which ſet under Parts	00	0	$1\frac{1}{2}$
8.) Multiply 6 Parts by 4 Inches, and that makes 24 Parts, that is 2 Parts; ſet under Parts	00	0	2
9.) Multiply 6 Parts by 6 Parts, which makes 36 Parts which is $\frac{3}{12}$ of a Part, which ſet under Parts	00	0	$1\frac{3}{12}$
The Sum	12	6	$9\frac{9}{12}$

II. *The ſame Decimally.*

The Decimal of 5 Foot 3 Inches and a half is	5.29
The Decimal of 2 Foot 4 Inches and a half is	2.37

	3703
	1587
	1058
	12.5373

Let any Man judge which of theſe ways ought to be embraced; the *Product* of this Multiplication 12 5373 being the *Decimal* of 12 *Foot* 6 *Inches* and a half. For my part I ſhall in all my *Examples* follow this way, as moſt eaſy and general.

Having here Delivered my Opinion concerning the Multiplying of *Feet* and *Inches*, or of *Feet*, *Inches*, and *Parts* of *Inches*, by *Feet*, *Inches*, and *Parts* of *Inches*: I now come to apply the ſame in *Meaſuring* the *Works* of the ſeveral *Artificers* belonging to *Building*, and I ſhall begin with

I. *Car-*

I. *Carpenters Works.*

The *Carpenters Works* measurably are principally these three. (1.) *Flooring.* (2.) *Partitioning.* (3.) *Roofing.* And all these are measured by the *Square* of 10 *Foot*, so that one *Square* of any of these *Works* contains 100 *Square Feet.*

I. *Of Flooring.*] *If a Floor be* 57 *Foot* 3 *Inches* (or 57.25) *Long, and* 28 *Foot* 6 *Inches* or 28.5 *Broad; How many Square of* Flooring *is there in that Room?*

57.25
28.5
28625
45800
11450
1631.625

Multiply 57.25, by 28.5, the Product will be 1631.625; which is, 16 Square 31 Foot, 7 Inches and a half, or 16 Square, one quarter 6 Foot and 6 ¼ inches: And here note, that in Decimals,

.25 } is { One *Quarter* / One *Half* / Three *Quarters* } of any thing whether { *Square* / *Foot* / *Yard* / *Rod*, &c.
.5
.75

And thus you shall find that if a *Floor* be 23 Foot 6 Inches (or 23.5) *Long*, and 16 Foot 6 Inches (or 16.5) *Broad*; there will be 37 Square, 1 Foot and 1 Quarter of a foot (or 3 Inches) contained therein.

II. Of PARTITIONING.] *If the Length of the* Partitioning *between Rooms be* 217 *Foot* 3 *Inches* (or 217.25) *and the height thereof* 10 *Foot* 7 *Inches* (or 10.58) *How many* Square *is there in that* Partition?

217.25
10.58
173800
108625
217250
2298.5050

Multiply 217.25 the Length, by 10.58 the Height; the Product will be 2298, 5050, that is, 22 Square, 98 Foot, and half a Foot; or 23 Square, wanting one Foot and a half as the in Margin.

Also, *If a* Partion (*or* Partitions) *be* 96.25 *Foot about, and* 13.62 *Foot high, you will find* 13 *Square,* 10 *Foot and* 8 *Inches to be contained therein.*

III. *Of Roofing.* It is a *Rule*, generally observed among *Workmen*, That the *Ground-Plot* of any *House*, taken from *Out* to *Out*, both in *Length* and *Breadth*; the Superficial Content of that *Ground-Plot* being taken once and a half, shall be equal to the *Roof* that will cover that *House*, the Rafters being true pitch, or if the *Roof* be *Hypped* off at one or both ends.

Thus, *If a* House *be* 36 *Foot deep, and* 18 *Foot broad, how much* Roofing *will there be to cover that House?*

The Depth multiplied by the Breadth, produceth the Flat or Ground-Plot.

For

For 36 multiplyed by 18, Produceth 646, ſuperficial Feet, the half whereof is 324 Foot; the Sum of theſe two is 972 ſuperficial Feet: That is, 9 ſquare, 72 Foot, or 9 ſquare and a half, and 22 Foot; or 9 ſquare 3 quarters wanting 3 Foot.

Depth of the Houſe	36
Breadth of the Houſe	18
	288
	36
The Ground-Plot.	646
Half thereof.	324
The Roof.	972

This way of meaſuring of Roofs, is generally received; but the more exact way, is by meaſuring the length of the Rafters by the length of the Houſes; and the Hypps (if any be) by themſelves.

Cieling Joyſts, and Aſhlering, are a ſort of Work done by the Carpenter, and theſe are alſo meaſured by the ſquare of 10 Foot, as Flooring and Partitioning were.

There are other Works about a Building, done by the Carpenter, which are meaſured only by the Foot-running Meaſure; that is, by the Number of Feet, in length only, And ſuch are theſe, *viz.*

Cantaliver Cornices
Modillion Cornices
Plain Cornices
Guttering
Lintelling
Breſt-ſomers

Skirt-Board
Rales and Balaſters
Timber Fronts
Paint-houſes
Shelving
Benching with Bearers, &c.

There are alſo,

Doors and Door-Caſes
Window Lights
Lutheren or Dormer-Lights
Balcony-Doors and Caſes
Celler-Doors and Caſes

Pediments
Columbs or Pillars
Pillaſters
Stairs and Stair-Caſes
Mantle-trees and Teſſels.

All which are rated at ——— *per* Piece.

Note. 1. In the meaſuring of Flooring, after that you have meaſured the whole Floor, you muſt make Deduction out of the ſame for the Well-holes for the Stairs, and for the Chimney-ways. ——And in Partitioning, you are to make Deductions for Doors and Door-Caſes, and for Windows if there be any; except (by contract) they are to be included.

Note. 2. In meaſuring of Roofing, there are ſeldom any Deductions made for the Holes for the Chimney-Shafts to paſs; the vacancies for

for Lutheren-Lights and Sky-Lights; for they are more trouble to the Carpenter than the Stuff which would make them good is worth.

Note 3. In measuring of the Timber-Frame of any Floor, you must add 9 Inches to the length or breadth, where the Joysts are let into the Brick-work; and one Foot of Timber for every Girders End let into the Wall.

II. *Of Plaisterers Works.*

The Plaisterers Works are principally of two sorts; namely, (1.) Work Lathed and Plaistered, which they commonly call Cieling. (2.) Work Rendered, which is of two sorts, *viz.* Rendring upon Brick-work, and Rendring between Quarters, as in the Partitions between Rooms: And all these are measured by the Yard square, or the square of 3, which is 9 square Feet to the Yard.

I. Of Cieling or Work Lathed, and Plaistered.] *If a Cieling be* 58 *Foot* 9 *Inches,* (*or* 58.75) *long, and* 23 *Foot* 7 *Inches* (*or* 23.58) *broad; how many square Yards do that Cieling contain?*

Multiply 58.75 the length, by 23.58 the breadth, the Product will be 1385.32 square Feet; which divided by 9, the Quotient will be 135.92, and so many square Yards is contained in that Cieling; that is 154 Yards *ferè*.

Or, you may find the quantity of Yards without Division, in this manner, by taking one third part of the length and breadth, and multiply them together, that Product shall give the Content of the Cieling in Yards and 100 parts of a Yard.

	58.75
	23 58
	47000
	29375
	17625
	11750
	1385.3250
One third part of 58.75, is	19 58
One third part of 23.58, is	7.86
	11748
	15664
	13706
The Content of the Cieling in square Yards.	153.8988

II. Of Rendring upon Brick-work.] *If the Rendring upon the Brick Walls about a House be* 1377 *Foot, and the height of the Walls* 27 *Foot; how many Yards of Rendring is there on those Walls?*

Multi-

Multiply 1377 foot, (the Girt about,) by 27, (the height of all the Stories) the Product will be 37179, the Number of ſquare feet in that Rendring: which divided by 9, the Quotient will be 4131, and ſo many ſquare yards of Rendering is there upon thoſe Walls.

	1377
	27
	9639
	2754
Feet	37179
Yards	4131

Or, if you multiply 459 (which is one third part of the Girt) by 9, (which is one third part of the height of all the Stories) the Product will be 4131 yards as before, without dividing by 9; as in the Margin.

	459
	9
Yards	4131

Note. 1. If there be any Chimney-ways in your Cieling, or Doorways, or Windows in your Partitioning, you muſt make Deduction for ſuch Defects.

Note. 2. When you Meaſure Rendring upon Brick-work, you are to make no deductions for Doors or Windows, for the Jaums and Heads of ſuch do commonly exceed the vacancies.

Note. 3. When you Meaſure Rendring between Quarters, you may very well deduct one fifth part of the Rendring for the Quarters, Braces, Intertices, *&c.* and ſometimes one forth part, if the Workman find Stuff; but if the Wormanſhip only, no Deduction ought to be made.

Note. 4. That Whiting and Colouring, are both Meaſured as Cieling and Rendring were, *viz.* by the Yard ſquare: But, whereas in rendring between Quarters, you deducted a forth or fifth Part; ſo in Whiting and Colouring between Quarters, you ought to add a fourth or fifth Part at leaſt, for the ſides of the Quarters and Braces, *&c.*

There other Works done by the Plaiſterers, as Work laid with Lime and Sand, in imitation of Stone-Work, and ſuch like; all which are to be meaſured by the Square of 3, or 9 ſquare feet to the yard.

III. *Of Joyners Works.*

Joyners do Meaſure their Work by the Yard Square of 9 foot, as the Plaiſterers do; but in taking the Dimenſions of their Work they differ: For the Joyners have a Cuſtom, and ſay, we ought to Meaſure all parts of our Work that our Plane touches. Wherefore, in the taking the height of any Room, where there is a Cornice about, and ſwelling Pannels and Mouldings; they uſe (with a Line) to girt over every Member of ſuch Cornice and ſwelling Mouldings; which will make the Room to Girt higher than in reality it is: But for Meaſuring about the Room, they only Meaſure it as it is only as flat. As,

Example 1. *If a Room of Wainſcot (which being girt downwards) doth contain in height* 15 *Foot* 7 *Inches (or* 15.58*) and the Compaſs about the ſame Room* 286 *Foot: How many ſquare Yards of Wainſcoting is in that Room?*

Multiply 15.58 by 286, the Product will be 4455.88, and ſo many ſquare feet are there in that Room: The which being divided by 9, will give in the Quotient 495.09, which is 495 yards and 1 foot; and ſo much Wainſcoting is there in that Room contained.

	15.58
	286
	9348
	12464
	3116
Feet	4455.88
Yards	495.09

Example 2. *If a Room be* 56 *Foot* 9 *Inches about, and the Girt downwards be* 10 *Foot* 3 *Inches: That Room will be found to contain* 64 *Yards and* 6 *Foot; which is* 2 *Third Parts of a Yard.*

In meaſuring of Joyners Work, there is another thing to be obſerved: And that is, In the meaſuring of Doors, Window-Shutters, Cupboard Doors, Drawers, and ſuch like Works, as are wrought on both ſides of the ſame Stuff; as Pews in Churches, *&c.* For theſe they account to be paid for Work and half Work; and ſo they are meaſured: For indeed, the Work is (tho' not half, yet) more, altho' the Stuff be the ſame.

Example 3. *If the ſeveral Window-Shutters about a large Room (being Meaſured upon the Superficies on one ſide) ſhould be* 78 *Foot* 4 *Inches (or* 78 33*) and the height of thoſe Shutters* 7 *Foot* 6 *Inches (or* 7.5*) how many Yards is contained in thoſe Window-Shutters, at Work and half Work.*

Multiply 78.33 by 7.5, the Product will be 587.475, the half whereof is 293.737; the Sum of theſe two is 881.212 (or 881 Foot) the .212 we reject: And 881 being divided by 9, will give in the Quotient 97, and 8 remaining; which is 97 Yards and 8 Foot, (which you may call 98 Yards, for the Content of thoſe Window-Shutters, at Work and half Work.

	78.33
	7.5
	39165
	54831
Product	587.475
Half Product	293.737
Their Sum	881.212

Note. That in Meaſuring of Joyners Works, you are to make Deductions for all Window-Lights; but you muſt meaſure the Window-Boards,

Boards, Sapheta-Boards, Cheeks or Jaums, and Skirt-Boards by themſelves. And for Chimney-Pieces and Ornamental Works about Door-Caſes, over Windows, Pediments, Cupboards, Skreens, *&c.* they for the moſt part (there being Carvers Work intermixed) are valued *per* Piece, *per* Foot, running, or otherwiſe, according to contract.

IV. *Of Painters Work.*

The taking of the Dimenſions for the Painters Works, within Doors, is the ſame with that of the Joyners, by girting about the Mouldings and Members of Cornices, *&c.* And it is but reaſon they ſhould be paid for that, upon which both their time and Colours are expended.

The Dimenſions ſo taken, the caſting up, and the reducing the Feet into Yards, is altogether the ſame with the Plaiſterers and Joyners; but the Painter never requires Work and half Work as the Joyners do; but reckons his Work once, twice, or thrice Primed or Coloured over. *Examples* in the ſeveral Works of Painters were ſuperfluous; thoſe foregoing being ſufficient: Only take notice, That Window-Lights, Window-Bars, Caſements and ſuch like things, they do by Tale at ſo much *per* Piece: And ſo do they (ſometimes) Cantalivers, Modillions, and the Ornaments between them.

V. *Of Glaſiers Works.*

Glaſiers do meaſure their Work by the Foot Square; ſo that the length of any Pane of Glaſs being multiplied by the breadth of the ſame, the Product produceth the Quantity of Square Feet contained in that Pane or Window-Light.

Example 1. *If a Pane of Glaſs be 3 Foot 9 Inches and a quarter (or 3.77) Foot long, and 2 Foot 5 Inches 3 quarters (or 2.43) Foot broad; How many Square Foot of Glaſs is there in that Pane?*

Length——3.77
Breadth——2.48

Multiply 3.77 Foot the length, by 2.48 Foot the breadth, the Product will be 9.35, which is 9 Foot 4 Inches and a quarter of an Inch for the true Quantity or Content of that Pane of Glaſs.

3016
1508
754

Content——9.3496

Example 2. *If the breadth of ſeveral Panes of Glaſs about a large Room being taken together, ſhould contain 32 Foot 6 Inches, (or 32.5)*

32.5) *and the common height of all thoſe Panes were* 6 *Foot* 3 *Inches and* 3 *quarters,* (*or* 6.31) *How many Foot of Glaſs is there in all thoſe Panes?*

If you Multiply 32.5 Foot (the breadth of all the Panes taken together) by 6.31 Foot (the common height of all thoſe Panes) the Product will be 205.075, which is 205 Foot and 3 quarter and half quarter of an Inch; and ſo many Square Foot of Glaſs is contained in all thoſe Panes.

32.5
6.31
325
975
1950
205.075

Note, That when Windows have half Rounds at the Top, they Meaſure them at the full height, as if they were Square. Alſo, Round or Oval Windows, are Meaſured at the full length of their Diameters; likewiſe Crocket Windows in Stone-work, are all Meaſured at their full Squares; and there is good reaſon for ſo doing: For the trouble in taking Meaſures to make them by, the Waſte of Glaſs in cutting them, and the extraordinary time expended in ſetting of them up, is far more valuable than the Glaſs which would fill up a Square of the ſame bigneſs.

VI. *Of Maſons Works.*

Maſons do Meaſure all their Works by the Foot, either Superficial or Solid.

I. *Of Superficial Meaſure.*

Example 1. *There is a Kitching Paved with* Purbeck-Stone, *whoſe length is* 19 *Foot* 6 *Inches* (*or* 19.5) *and breadth* 14 *Foot* 9 *Inches,* (*or* 14.75) *How many Square Foot of Pavement doth that Kitching contain?*

Multiply 14.75 Foot by 19.5 Foot, the Product is 287.62 Foot; this is 287 Foot 7 Inches and a half; and ſo much Pavement doth that Kitching contain.

14.75
19.5
7375
13275
1475
287.625

Example

Example 2. *There is an Isle in a Church that is* 42 *Foot* 6 *Inches* (*or* 42.5 *Foot*) *long, and* 8 *Foot* 3 *Inches and* 3 *quarters* (*or* 8.31 *Foot*) *broad, which is Paved with Squares of* Purbeck *and Black Marble; How many Square Feet doth it contain?*

Length——42.5
Breadth——8.31

The length 42.5 Foot Multiplied by the breadth 8.31 Foot, giveth in the Product 353.175, which is 353 Foot and 2 Inches; and so many Foot doth that Pavement contain.

425
1275
3400

Product—353.175

Example 3. *There is a Wharf which is faced with Ashlar set in Tarras, and is in length* 372 *Foot* 8 *Inches* (*or* 372.66 *Foot*) *and in the Scarpe* (*or Depth*) 12 *Foot* 9 *Inches,* (*or* 12.75 *Foot*) *How much Ashlar is contained therein?*

Ashlar is laid as it is cut out of the Quarries, of several lengths and different thicknesses (as 9 Inches is a common thickness) but this is not allowed in the Measure, but the Superficies on the outside is only to be regarded: Wherefore,

272.66
12.75

Multiply 372.66 Foot, the length of the Wharf, by 12.75 the Scarpe (or Depth) of the Wharf; the Product will be 4751.41, which is 4751 Foot, and almost 5 Inches; which is the Content of the Wharf in Superficial Feet.

186330
260862
74532
37266

4751.4150

II. *Of Solid Measure.*

Example 1. *There is a Block of Marble* (*or other Stone*) *whose length is* 6 *Foot* 3 *Inches,* (*or* 6.25 *Foot*) *and the breadth thereof* 3 *Foot* 2 *Inches and a quarter,* (*or* 2.18 *Foot*) *and the depth thereof is* 2 *Foot* 7 *Inches and a quarter, or* 2.6 *Foot*) *How many Solid Foot of Stone is contained in that Block?*

If you Multiply 6.25 Foot the length, by 2.18 Foot the breadth, the Product will be 13.6250 Foot, which is the Superficies; and that Product multiplyed by 2.6 Foot the depth, will produce 35.42500 (or 35.42 Foot) which is 35 Foot 5 Inches for the Solidity of the Marble Block, or Stone. Or if you multiply 2.18 Foot the breadth, by 2.6 Foot the depth, the Product 5.668 will be the Superficial Content of the end of the Stone; and that multiplied by 6.25 Foot the length, will give in the Product 35.42500; or 35 Foot 5 Inches for the Solid Content of the Stone, as before.

Length —— 6.25
Breadth —— 2.18

5000
625
1250
13.6250
Depth 2.6
817500
27250
35.42500

VII. *Of Bricklayers Works.*

The Principal Works done by Bricklayers about a Building, are *Tyling*, *Walling*, and *Chimney-Works*, to which I may add *Paving* with *Bricks* or *Tyles*.

I. *Of Tyling.*

Tyling is measured by the Square of 10 Foot; as Flooring, Partitioning and Roofing in the Carpenters Work were: So that in a House covered with a Plain Roof, the difference between the Roofing and the Tyling will not be much, yet the Tyling will be most; for that the Tyles go beyond the Roof at both ends over the Gable-ends, and are struck with Lime and Hair-Morter; and they also hang somewhat over the Eves-Boards on either side, if the House stand alone: And again, in some Roofs there are many Hips and Valleys, for which the Bricklayer will require running measure; for the which (in some Cases) he ought to be allowed; but for the most part he is not, except he do the Work by the Day.

To give Examples hereof were needless; For the breadth of the Tyling on both sides, multiplied by the length of the Tyling (both being taken in Feet and Inches) will give the Content in superficial Feet; every hundred whereof is one Square, 25 a quarter, 50 half, and 75 three quarters, of a Square.

II. *Of Walling.*

Bricklayers do Measure their Walls (and other their Works) by the Rod Square, each Rod, Pole or Perch (for by all these Names it is called) containing 16 Foot and a half in length, so that one Rod in length and one in breadth, do make one Square Rod, containing upon the

the Superficies of any Wall 272 Superficial feet, and one quarter of a foot (or 272.25 foot) for 16.5 foot multiplied by 16.5 foot will produce 275.25 foot, which is one Superficial Rod.

There is moreover to be obſerved in Brick-work, the reducing thereof from any thickneſs to a Standard thickneſs; For in Walls and Foundations of Houſes, the Walls are of different thickneſſes; all which muſt be reduced to one, *viz.* to one Brick and a half thick; as by Examples following.

Example 1. *If a Brick Wall be* 192 *Foot long, and* 12 *Foot high, How many Rod of Brick work is contained therein?*

Multiply 192 the Length, by 12 the Height, the Product will be 2304, and ſo many Superficial feet are contained on the outſide of the Wall; which divided by 272 (the number of Superficial feet in one Rod, for the quarter of a Foot, it is always rejected as of no validity) the Quotient will be 8, and 128 remaining, which is 8 Rod and 128 foot, which 128 foot, divided by 68 (the number of feet contained in one quarter of a Rod) the Quotient will be one Quarter of a Rod, and 60 foot remaining; ſo that the whole Wall contains 8 Rod one quarter, and 60 foot, which is 8 Rod and a half wanting 8 Foot.

```
  192
   12
 -----
  384
  192
 -----
272)2304(8 Rod
 2176
 ----
  128 Rem.

68)128(1 Quar.
 68
 --
 60 Foot.
```

Example 2. *If a Wall, (or the Side of a Houſe) be* 24 *Foot* 6 *Inches (or* 24.5 *Foot) long, and* 37 *Foot* 8 *Inches (or* 37.66 *Foot) high; How many Rod is contained therein?*

Multiply 37.66 by 24.5, the Product will be 922.67; that is, 922 Foot 8 Inches, the which you may call 923 Foot; which being divided by 272, the Quotient will be 3 Rod, and 107 Foot remaining, which divide by 68, and the Quotient will be one Quarter of a Rod and 39 Foot remaining. And this would be the true Content of the Wall, if the Wall were all of one thickneſs (namely one Brick and a half) from the bottom to the top.

```
 37.66
  24.5
 ------
 18830
 15064
  7532
 ------
 922.670
272)923(3 Rod
 816
 ---
 107
68)107(1 Quar.
 68
 --
 39 Foot.
```

But

But there is ſomething more to be conſidered in the Meaſuring of Brick-work, namely, the thickneſs of the Wall; for the thicker the Wall is, the more Rods are contained therein: For if the Wall be thicker than one Brick and a half, a ſquare Rod, (or 272 Foot) Meaſured upon the Superficies of the Wall, will contain more than one Rod of Brick-work: And a Rod, (or 272 Foot) of Wall, which is leſs than one Brick and half thick, will contain leſs than one Rod of Brick-work when reduced to the Standard of one Brick and half thick. So that if a Wall be three Bricks thick, every Rod (or 272 Foot) thereof, meaſured upon the Superficies of the Wall, will contain two Rods of Brick-work. —And if the Wall be thicker, as 4 Bricks and a half; then one Rod meaſured on the face of the Wall, will contain three Rods of Brick-work, *&c.* and therefore, for the ready reducing of Brick-work of any Number of Bricks and half Bricks thick, to the Standard thickneſs of one Brick and a half thick, take this

GENERAL RULE.

Multiply the Number of Superficial Feet, that are found to be contained upon the Superficies of any Wall, by the Number of half Bricks which that Wall is in thickneſs: One Third Part of that Product ſhall be the true content of that Wall, reduced to the Standard thickneſs of one Brick and a half.

This Rule Explained.

Example 3. *If a Wall be* 72 *Foot long,* 19 *Foot high, and Five Bricks and a half thick; how many Rod of Brick-Work is contained therein when reduced to Standard thickneſs?*

Multiply

Multiply 72 by 19; the Product will be 1368, and so many superficial Feet doth that Wall contain. ——This Number, multiplied by 11 (the Number of half Bricks the Wall is thick) produceth 15048; one third part whereof is 5016: And so many Feet doth that Wall contain; it being reduced to Standard thickness, of one Brick and half. Lastly, Divide 5016, by 272 the Quotient will be 18 Rod, and 120 Foot remaining; which Divided by 68, gives in the Quotient one quarter of a Rod; and 52 Foot remaining: So, that the true Content of this Wall, when reduced, as aforesaid, is 18 Rod, 1 Quarter and 52 Foot, as in the Margin. And so of any other length, height, or thickness: As,

72
19

648
72

Sup. F. 1368
11

1368
1368

15048
272) 5016 (18 Rod.

272
2296

2176
68) 120 (1 Quar.

68
52 Feet.

	Long	High	Thick		R.	Q.	E.
If a Wall be	327 .	16 .	2	It will be found to contain.	29 .	0 .	48
	45 .	35 .	3½		13 .	2 .	03
	120 .	20 .	1		5 .	3 .	36

III. *Of Chimneys.*

The Chimneys in most Buildings are agreed for by the Fire-Hearth in each Room: And sometimes they are included in the rest of the Brick-work in the Building, and Paid for by the Rod, and Measured with the rest of the Brick-work of the Building; in manner following.

First, If the Chimney to be measured stand single, and alone, the usual way is to girt it about; and if the Jaums are but one Brick-thick, and wrought upright over the Mantletree to the next Floor; then girt it about for a length, and the height of the Story for a breadth, at one Brick thick.

But ſecondly, If the Chimney ſtand againſt a Wall that is before meaſured; then, the breadth of the Breaſt, and the depth of the two Jaums is the length, and the height of the Story the breadth, at one Brick and a half (if the Jaums be ſo thick) and nothing to be deducted for the Area between the Hearth and Mantletree, becauſe of the Wyths and Gatherings of the Breaſt and Wings, to make room for the Hearth in the next Story above.

Thirdly, the Shafts of Chimneys, to Meaſure them you muſt girt them about with a Line in the ſmalleſt place, and that ſhall be your breadth, and the height of the Shaft your length; at one Brick, if the Shaft be but 4 Inch Work; but at Brick and half, if the Shaft be 9 Inches.

IV. Other Bricklayers Works, which are Meaſured by the Foot, Running Meaſure: are theſe, *viz.*

Cornices of all ſorts.
Facioes.
Water-Tables wrought.
} { *Straight* } *Arches.*
{ *Skeen* }
{ *Hypps and Valleys.*

Water-Courſes, &c.

In the Meaſuring of which; note, that when you Meaſure Arches, either Streight, Skeen or Circular, you muſt take your Meaſure in the middle of them, as a mean between their Tops and Bottoms.

V. Other Works valued *per* Piece, *viz.*

Peers. *Pilaſters.* } Plain or Ruſtick { *Pediments.* *Grotto's*, &c.

All theſe are valued according to their largeneſs, and goodneſs of the Work and Stuff; and ſo indeed ought all Ornamental Works.

VI. *Of Paving.*

There often comes to the Bricklayers Hands, the Paving of Kitchens, Cellers, Grotto's, *&c* with Bricks, Tyles, Flanders Bricks, *&c.* All which are meaſured by the Yard Square, or 9 Foot, as Plaiſterers Work is meaſured; of which take one Example.

Example. *There is a Celler which is Paved with Bricks (or Tyles) which is* 32 *foot* 6 *inches (or* 32.5 *foot) long, and* 21 *foot* 9 *inches (or* 21.75 *foot) broad; How many Yards of Paving is there in that Celler?*

Multiply 32.5 foot, by 21.75 foot; the Product will be 709 foot: Which divided by 9, gives in the Quotient 78 yards, and 7 foot remaining, which is above 3 quarters of a yard for the Content.

Note, That in the meaſuring of Brickwork: If you take the Dimenſions of any Building on the outſide, from end to end, [illegible] the Front thereof; you muſt take the depth thereof on the inſide.

Note,

Note alſo, That you muſt make Deductions for all Doors, Window-Lights, *&c.* in Brick-work, according to the thickneſs of the Walls, in which they are.

Of Digging.

The Digging of the Ground for Cellers, and for the Laying of the Foundations for Buildings, is often put upon the Bricklayers. This Work is done by the Yard ſolid, which contains 27 ſolid Feet; and that is uſually counted a Load. Now,

Example. *If a Celler be to be Digged, which ſhall be* 27 *Foot long,* 16 *Foot broad, and* 8 *Foot deep: How many Yards of Digging will there be?*

Multiply 27 by 16, the Product will be 432: And that multiplied by 8, (the depth) the Product will be 3456, by 27 (the Number of ſolid Feet in one ſolid Yard) the Quotient will be 128, and ſo many ſolid Yards of Digging will there be required to ſink ſuch a Celler.

```
  27
  16
 ---
 162
  27
 ---
 432
   8
 ---   Yards
27) 3456 (128
    ...
 ---
  27
  75
 ---
  54
 216
 ---
 216
 000
```

How to Eſtimate *the* Charge *of the* Erection *of any* Houſe *of any* Height *and* Bigneſs, *Built of* Brick *and* Timber.

THat you may give a near *Eſtimate* of the *Charge* of the Erection of any *Edifice*, you muſt have given you, (1.) The *Dimenſions* thereof, not only in *length* and *breadth*, but alſo in *height*, in reſpect of the Number of *Stories*: For (2.) By the *length* and *breadth* you may find the *quantity* of *Squares* upon every *Floor*, and alſo in the *Roof* and *Tyling*: And (3.) By the *height* you may give a near Eſtimate of the *Roes* of

Brickwork, contained in the *Walls* round about, and in *Partition* Walls, if any be; and alſo in the *Chimneys*: Then, (4.) Conſider how many Pairs of *Stairs*, and of what kind. (5.) What *Partitions* of Timber with *Doors*. (6.) What *Timber-Front*. (7.) What Number of *Window-Frames* and *Lights*. (8.) Iron-Work *&c.* Of all which I have already diſcourſed in general: But now to deſcend to a particular *Example*.

What will be the Charges of Erecting of a Fabrick, of Brick-Walls and Timber, which ſhall be 20 Foot in Front, 44 Foot deep; to conſiſt of Cellers, Three Stories, and Garrets? Suppoſing the Prices of Materials to be as followeth, *viz.*

	l.	*s.*	*d.*
For Bricks the Thouſand	00	16	00
Tyles the Thouſand	01	05	00
Lime the Hundred	00	10	00
Sand the Load	00	03	00
Oak, or Fir-Timber the Load	02	15	00
Deal Boards the Hundred	07	10	00
Laths the Bundle	00	01	00

Then for the Plaiſterers Works.

For Lathing, Plaiſtering, Rendring, and Waſhing with White and Size, the Yard	00	01	02
Lathing and Plaiſtering, the Yard	00	00	10
Plaiſtering and Sizing, the Yard	00	00	06

Smiths Work.

For Iron Balconies, the Pound	00	00	05
Folding Caſements, the Pair	00	16	00
Ordinary Caſements	00	04	06

Then, For Window-Frames; the Light.

Glazing with Squares ordinary, the Foot	00	00	05
Wrought Lead, the Hundred Groſs	00	18	00

For Painting.

Window-Lights	00	00	06
Shop-Windows, Doors, Pails, *&c.* the Yard	00	01	00

Now, From theſe Rates of Materials for Building and for Workmanſhip: Such a Houſe as is here propoſed, will amount unto about 360*l.* which is near 41 *l. per* Square.

The

The Description of a Five *or* Ten Foot Rod, *very useful in taking the* Dimensions, *and Casting up of the* Works *of the several* Artificers, *relating to* Building: *And also thereby to* Measure Angles; *whereby the true* Ground-Plot *of any* Building, *with* Yards, Gardens, *&c. may be laid down upon* Paper *or* Vellum.

THE *Rod* (whether of Five or Ten Foot long) consisteth of two Square pieces of Box, or other Wood, each of them the half length of the *Rod*, when drawn out at its full length: ——These two Pieces, have (each of them) a *Brass Socket* at one end, through which the two pieces or Rulers are to pass, or to slide one by the other, in all respects as those *Rules* are made, which *Glaziers* commonly use to take their Measures with: And it would be convenient to have a *Screw* to one of the *Sockets*, to keep the two Rulers (when drawn out to any determined length) from moving from that Position or Place: And a *Tooth* or *Check* at the end of the other Rulers to keep it from dropping through the other *Socket*.

Upon the two outermost edges of each *Ruler*, let there be divided *Feet* and *Inches*, with halves and quarters; and also *Foot-Measure*, (that is, one foot divided into 100 equal parts) and let these face each other so, that you may take any Dimension either in *Feet*, *Inches*, and Parts of *Inches*, or in *Foot-Measure*, or) *Decimal Parts*, at one and the same time.

The two inner Edges of each *Ruler*, are also divided in the same manner as the outward Edges were, but the Numbers for the Feet, (which ought to be of large Figures) must be so ordered that when the *Rulers* are drawn out to any Measure, or accidently, the Numbers on the inside shall tell you readily (in *Feet*, *Inches*, and parts of *Inches*, and also in *Foot-Measure*) how much is contained between the two ends of the *Rod* when so drawn out.

The two *Rulers* thus divided on both sides, you may take the Measure of any thing (less than half the length of the *Rod* when drawn out) by the *Divisions* on the outer Edge; but any *Dimensions* greater than half the length of the *Rod*, must be taken by drawing out of the *Rulers*, and then the Divisions on the inside will give the length.

On one of the *Flat Sides* of either *Ruler* let there be a *Double Line* of *Numbers*, such as is usually put upon *Carpenters Rules*, but let them be as

as large as the length of the *Rulers* will conveniently permit: Let the Diviſions of theſe two *Lines* be placed as near the inner Edges of the two *Rulers* as may be, ſo that they face one the other, and ſo is your *Rod* finiſhed——But if you pleaſe, you may have on the other *Flat Side* one other whole *Line* of *Numbers*, and another *Broken Line* which will ſerve for the *Extraction* of the *Square Root* by Inſpection; and for other Purpoſes, of which we ſhall have no need in this place. Or inſtead thereof, you may furniſh that other ſide with Scales of Chords and *Equal Parts*, which will be neceſſary for drawing of *Draughts* or *Deſigns*, &c.

The Uſe of the Sliding-Rod.

THE Rod being thus prepared, I will now ſhew you how to work *Multiplication*, *Diviſion*, and the *Golden Rule* (or *Rule of Three*) upon the ſame, and that without Compaſſes; whereby you may caſt up any Dimenſions taken in *Feet* and *Inches*, or in *Foot-Meaſure*, according to former Directions.

1. *Multiplication by the Rod.*

The two *Sides* of the *Rod*, although both of them have the ſame *Line of Numbers* upon them; yet (in working of any *Queſtion* in *Arithmetick* upon them) they muſt upon neceſſity have ſome *Names* or *Terms* given, to diſtinguiſh one from the other; which two *Names* ſhall be only THE FIRST and THE SECOND, ſo that when you hold the *Rod* in both your hands, or lay it upon a Table before you; [Always] call that *Line of Numbers* which lies next to you, THE FIRST, and that fartheſt from you THE SECOND. This being premiſed, I will proceed to Practice by *Examples*.

Eaxmple 1. *Let it be required to* Multiply 8 *by* 6.

Bring 6 (in the Second) to ſtand againſt 1 (in the Firſt) then will 8 (in the Firſt) ſtand againſt 48 (in the Second) which is the Product of 6 multiplied by 8. Or,

If you bring 8 (in the Second) to ſtand againſt 1 (in the Firſt) then will 6 (in the Firſt) ſtand againſt 48 (in the Second) as before.

Example 2. *Let it be required to* Multiply 24 *by* 5.

Bring 5 (in the Second) to ſtand againſt 1 (in the Firſt) then 24 (in the Firſt) will ſtand againſt 120 (in the Second) which is the *Product* of 24 multiplied by 5. Or,

If you bring 24 (in the Second) againſt 1 (in the Firſt) then will 5 (in the Firſt) ſtand againſt 120 (in the Second) as before.

Example 3. *Let it be required to* Multiply 37 *by* 19.

Bring

Bring 37 (in the Second) againſt 1 (in the Firſt, then will 19 (in the Firſt) ſtand againſt 703 (in the Second) which is the *Product* of 37 Multiplied by 19. Or,

If you bring 19 (in the Second) to ſtand againſt 1 (in the Firſt) then will 37 (in the Firſt) ſtand againſt 703 in the Second.

Example 4. *Let it be required to* multiply 45 *by* 29.

Bring 45 (in the Second) againſt 1 (in the Firſt) then will 29 (in the Firſt) ſtand againſt 1305 (in the Second which is the *Product* of 45 multiplied by 29.

Now this *Product* conſiſting of *Four Figures*, it will be ſomething difficult to give an exact Determination of the laſt Figure, the Lines ſhewing only the three Firſt Figures exactly, and therefore the Fourth muſt be only eſtimated: But to direct you to the juſt Number of Places that any Product muſt conſiſt of, and alſo, what the laſt Figure ought to be: Obſerve theſe two RULES.

I. There will be as many *Figures* in the *Product* as there are *Figures* in the *Multiplicand* and *Multiplier*, as here, in 1305 are four *Figures*, and ſo many were in 45 and 29; Thus it is, when the two firſt *Figures* of the *Product* are leſs than the *Figures* of the *Multiplicand* or *Multiplier*; as here 13, (the two firſt *Figures* of 1305) are leſs than either 29 or 45—But, when the two firſt *Figures* of the *Product* are more than the *Multiplicand* or *Multiplier*; then the *Product* will conſiſt but of *Three Places*: As for *Example*, If you multiply 81 by 12, the *Product* will be but 972 (conſiſting but of *Three Places*) becauſe 97, the two firſt *Figures* of 972, is more than either 12 or 81.

II. Obſerve that when a *Product* conſiſts of *Four Figures*, (as the *Product* of 136, multiplied by 19, will be 2584) becauſe 25 is greater than 13 or 19, by the foregoing Rule.

But to eſtimate the laſt *Figure* rightly, multiply in your Mind 6 (the laſt *Figure* of the *Multiplicand* 136) by 9 (the laſt *Figure* of the *Multiplier* 19) the *Product* will be 54; wherefore, the laſt *Figure* therefore 4 will be the laſt *Figure* of 2584.

Example 5. *If a* Marble Pavement *in a Summer-Houſe (or other thing whatſoever) be* 7 *Foot* 9 *Inches (or* 7.75 *Foot) long, and* 6 *Foot* 6 *Inches (or* 6.5 *Foot) broad*; *How many Foot is contained therein?*

Bring 6.50 (in the Second) to 1 (in the Firſt) then againſt 7.75 (in the Firſt) you ſhall find 50.37 Foot (in the Second) for the Content.

Example 6. *If Board or Plank be* 12.4 *Foot long, and* 3.7 *Foot broad*; *How many Foot is contained therein?*

Bring

Bring 12.4 (in the Second) to 1 (in the First) then againſt 3.7 (in the First) ſtands 45.8 (in the Second;) which is 45 Foot, 8 Tenths of a Foot, or 45 Foot 10 Inches.

II. *Diviſion by the Rod.*

As in *Common Arithmetick*, the beſt *Proof* of *Multiplication* is by *Diviſion*; and of *Diviſion* by *Multiplication*; I ſhall therefore frame my *Examples* in *Diviſion*, to anſwer thoſe in *Multiplication*. Wherefore,

Example 1. *Let it be required to divide* 48 *by* 6.

Bring 6, (the Diviſor) counted in the Second, to ſtand againſt 1 (counted in the First;) then will 48, (the Dividend) counted in the firſt, ſtand againſt 8 (counted in the Second) which is the Quotient.

Example 2. *Let it be required to Divide* 120 *by* 24.

Bring 24 (in the Second) to ſtand againſt 1 (in the First) then will 120 (in the Second) ſtand againſt 5 (in the First) which is the Quotient required.

Example 3. *Let it be required to Divide* 703 *by* 37.

Bring 37 (in the Second) to 1 (in the First) then will 703 (in the Second) ſtand againſt 19 (in the First) which is the Quotient.

Example 4. *Let it be required to Divide* 1305 *by* 45.

Bring 45 (in the Second) againſt 1 (in the First) then will 1305 (counted in the Second) ſtand againſt 29 (in the First) which is the Quotient required.

Example 5. *Let it be required to Divide* 50.37 *Foot by* 7.75 *Foot.*

Bring 7.75 (counted in the Second) to ſtand againſt 1 (counted in the First) then will 50.37 (counted in the Second) ſtand againſt 6.5 (counted in the First) and that is the Quotient.

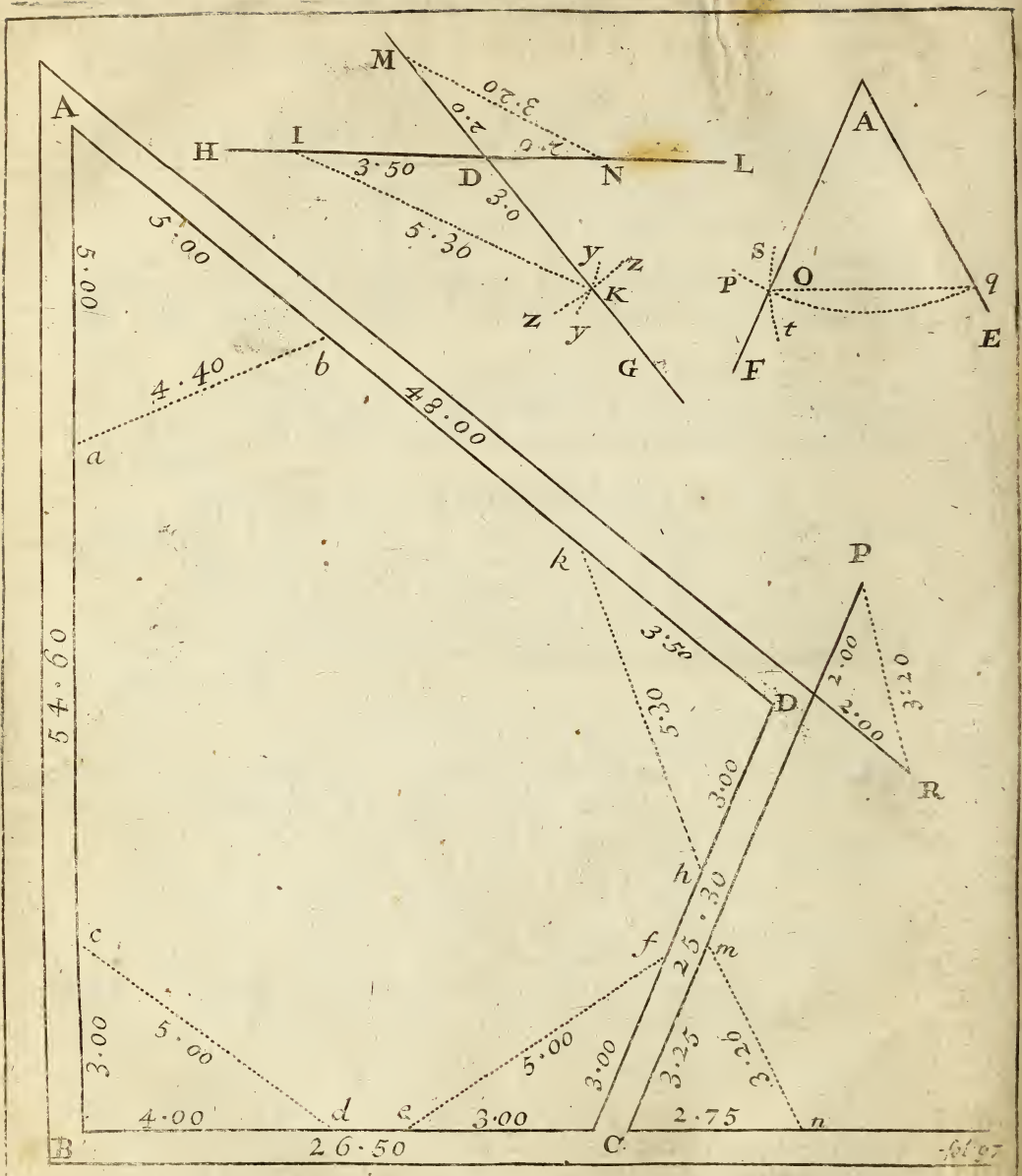
Example 6. *There is a Piece of of Square Ground, which is* 12 *Pole broad, and it contains* 156 *ſquare* Poles *or* Perches: *How long is that piece of Ground? Divide* 156 *by* 12: Therefore,

Bring 12 (counted in the ſecond) againſt 1 (counted in the firſt) then againſt 156 (counted in the Second) ſtands 13 (in the firſt) which is the length of the piece of Ground in *Perches.*

III. *The Golden Rule, or Rule of Three by the Rod.*

To work the *Golden Rule* or *Rule of Three* by the *Rod*, is no other than to *multiply* and *divide* by the *Rod*; and therefore I will be but brief therein. Only in working, obſerve this

RULE. Count the *firſt* term of your *Proportion*, upon the *firſt*, and the *ſecond term* upon the *ſecond*: And then, the *third term*, counted upon the *firſt*, will give you the *fourth term* (which is that required) upon the ſecond: *Examples* will make this plain. Exam-


M
A
H
I
D
N
L
3·50
3·0
5·30
5·00
5·00
4·40
a
b
48·00
y
z
K
z
y
G
A
S
P
O
q
t
F
E
k
P
3·50
2·00
2·00
D
R
5·30
3·00
h
54·60
c
f
25·30
m
3·00
5·00
5·00
3·00
3·25
3·25
4·00
d
e
3·00
2·75
n
B
26·50
C
fol 97

Example 1. *If one Foot of Glaſs will coſt* 5 *Pence, what will* 29 *Foot and a half* (*or* 29.5) *Foot coſt?*

Count 1 upon the firſt, and to it, bring 5 in the ſecond; then count 29.5 upon the firſt, and againſt it (upon the ſecond) you ſhall find 147.5; and ſo many Pence will 29 Foot and a half coſt which is 12 Shillings, 3 Pence, 2 Farthings.

Example 2. *If one Square* (*or* 100 *Foot ſquare*) *of* Tyling, *coſt* 37 *Shillings*; *what will* 18 *Foot of the ſame* Tyling *come to?*

Count 1 in the middle of the firſt, for 1 Square or 100 Foot: to which bring 37 Shillings (the Price thereof) counted on the ſecond; then againſt 18 (the number of Feet) counted upon the firſt, ſtands 6.66, which is 6 Shillings 8 Pence, for the worth of 18 Feet.

Example 3. *If one Yard* (*which is* 9 *Foot*) *of* Plaiſtering, *will coſt* 9 *Pence*; *what will* 125 *Yards come to?*

Count 1 Yard in the firſt, and to it bring 9 in the ſecond, then count 125 in the firſt, and againſt it in the ſecond, you ſhall find 1125 Pence, which is 4 Pound, 13 Shillings and 9 Pence, for the Price of the 125 Yards.

Example 4. *The Circumference of a Circle being given,* viz. 355 *Foot, to find the Diameter of that Circle.*

The Proportion of the *Circumference* of any *Circle*, to the *Diameter* of that *Circle*, is as 22 is to 7. Wherefore,

Count 22 upon the firſt, and bring againſt it 7, counted in the ſecond: Then count 355 (the Circumference given) in the firſt, and againſt it, in the ſecond, you ſhall find 113, which is the *Diameter* of that *Circle*, whoſe *Circumference* is 355.

Example 5. *The* Diameter *of a* Circle *being given,* viz. 113 Foot, *to find the Circumference.*

The Proportion.] As 7, is to 22, ſo is the *Diameter*, to the *Circumference.*

Count 7 in the firſt, to which bring 22 counted in the ſecond; then againſt 113 counted in the firſt, you ſhall find 355 in the ſecond; and that is the *Circumference.*

In like manner, if the *Diameter* of a *Circle* were 35, the *Circumference* will be found to be 110: And ſo of any other.

Example 5. *The* Diameter *of a* Circle 8 Foot *being given, to find the* Area, *or* Superficial Content *of that* Circle.

The Proportion.] As 28, is to 22; ſo is the ſquare of the *Diameter* 8, *viz.* (64) to the Area.

Count 28 in the firſt, to which bring 22 in the ſecond, then count

64 in the first, and against it, in the second you shall find 50 28 which is 50 Foot, 3 Inches and a quarter, for the *Area* of that *Circle*, whose *Diameter* is 8 Inches.

Example 6. *The* Circumference *of a* Circle 50 *Foot, being given, to find the* Area.

The Proportion.] As 88 is to 7, so is the square of the *Circumference* to the *Area*.

Bring 50 the Circumference, counted in the second, to 1 in the first; then against 50 in the first, stands 2500, which is the square of the Diameter (or 50 multiplied in it self.) Then,

Count 88 in the first; to which bring 7 in the second; then count 2500 in the first, and against it in the second you shall find 199 Foot, for the Area of that Circle, whose Circumference was 50 Foot.

The Use of the Sliding-Rod, in Measuring of Angles.

IT is usual with *Artificers*, in setting out of a Right Angle for the Erection of any Building standing alone, to measure out eight Foot in the Front, and then six Foot on the side, moving the six Foot Rod on the one side to and fro, 'till a ten Foot Rod being put to the end of the eight Foot in the Front, doth justly touch the end of the six Foot on the side; and then the Angle included between the eight and six Foot Rods, is a Right Angle. This is true, for eight, six and ten, are but the double of *Pythagorus* his three Numbers, 3, 4 and 5, which joyned will make a Right Angle: But,

I. To set out a Right Angle by this Rod.

Set four Foot of this Rod on the Front, and open the Rod to its full length of five Foot; then lay the end of the five Foot to the end of the four Foot; and with the other end sweep an Arch upon the Ground, then shut the Rod to three Foot, and bring it to the other end of the four Foot; and where it crosses the Arch made by the five Foot, that is the Point, and a Right Line drawn by it (or a Line strained) will make a *Right Angle*.

But for to set out Right Angles for Foundations, is not it that I commend this Rod so much for, but for its ready taking of Dimensions in all Cases, and especially in Vacancies, as in breadths of Doors, Windows, between Chimney-Jaums, Heights of Stories, *&c.* wherein a ten Foot Rod is too cumbersom, and a too Foot Rule too dificient.

And this is not all neither, But the chief thing I commend it for, is for the exact taking of the Angles in any *Building*, and so to lay them

them down upon Paper, by which you may make a true Draught of any Houſe, or Houſes, Yards, Gardens, *&c.* And that ſhall be the Work of this Section: As in Example following.

Let A B C D be an irregular Building, *a true Plot whereof you would lay down upon Paper or Vellum.*

Firſt, Upon a Sheet of Paper draw Lines according as you ſee the Walls to run, or bear one from another; and take notice, where any *Doors*, *Chimneys*, *Stair-Caſes*, and ſuch things ſtand, and make Signs thereof in your waſte Paper, whereabouts any ſuch things are. It matters not how defective the Lines on this Paper be drawn, in reſpect of their *lengths*; but let there be ſo many of them as there are in the *Building*, and no more nor leſs. Call this *waſte Paper* your *Eye-Draught*: Which prepared as aforeſaid,

Secondly, Meaſure the *length* of the *Walls* on the inſide of the *Houſe*, as from A to B 54 Foot 6 Inches, from B to C 26 Foot 5 Inches, from C to D 25 Foot 3 Inches, and from D to A 48 Foot: Setting theſe Numbers down as you meaſure them, upon the correſpondent Lines in your *Eye-Draught*: And, if there be any *Chimneys*, *Stair-Caſes*, *Doors* and *Windows*, take notice of them alſo, and their reſpective *Dimenſions*, ſetting all down in your *Eye-Draught*.

Thirdly, Then go to the ſeveral Angles in the Building (or as many of them as you can conveniently come at) and meaſure them in this manner. (1.) Go to the Angle A; and with your Rod opened to any length, as here it is to its full length of 5 Foot, which diſtance mark upon the Walls A B and A D, from A to a, and from A to b: Then with your Rod, put one end of it to a, and open it 'till the other end touch the mark at b, and look how much it is opened from end to end, which we will ſuppoſe 4 Foot (or 4.00 of the Foot-Meaſure) Draw a Line as a b in your *Eye-Draught*, and ſet to it 4.00, and 5.00 to the ſides A a, and A b, juſt as you ſee it done in the Diagram here annexed. (2.) Go to the Angle B, and meaſure 3.00 Foot from B to c, and 4.00 Foot from B to d, (or any other Meaſures as the place will beſt permit) and take with your Rod the diſtance between c and d, which finding to be the juſt length thereof, *viz.* 5.00, you may conclude, that the Angle at B is a true Square (or Right) Angle: Mark this alſo in your *Eye-Draught*. And, (3.) Go to the Angle C, where meaſure out upon the Walls from C to e and f 3.00 Foot; and then finding the diſtance between e and d to be 5.00 Foot, note that down in your *Eye Draught* alſo. ——And, (4.) Go to the Angle D, where meaſure out from D to h 3.00 Foot

and from D to k 3.50 Foot: And then finding the distance between h and k to be longer than your Rod, you may strain a Line from h to k (or supply it by a two Foot Rule) and you find it to be 5.30 Foot, which note down in your *Eye-Draught* also: And thus have you taken all the *Angles*, and *measured* all the *Lines* on the inside of this *Building*.

But it may sometimes so fall out that you cannot conveniently come to the Angular Points of all the Angles that will be requisite to be taken within the House; as suppose you could not come to the Point of the Angle at C within the House, (then in such Case) get leave of the next Neighbour, and go in and take it there, measuring upon the other side of the Wall from C to m, 3.25 Foot and from C to n 2.75 Foot, and take the distance between m and n 3 20 Foot, and note it in your *Eye-Draught*.

Again, suppose that the Angle at D were the Corner of a Street, and that you could not measure the Angle at D within the House, for that there was a Chimney in that Angle: In such Case, (1) Apply a Rod or any streight Piece to the Wall A D, and another to the Wall C D, letting the ends of those two Rods extend beyond the Angle of the Wall at D, any Measure whatsoever (as here I have made them to extend, 2.00) from D, to P and R. —(2.) Take the Distance between P and R, with your Rod, and you finding it to be 3.20 Foot, Note that also down in your *Eye Draught*, as you did the Measures of other Angles: And thus may you take any Angles whatsoever by this Rod, and that more exactly than by any other way I can at present think of; I am sure far more exactly than by such ways, as I have seen some Artificers practise, by opening of their Joynt-Rule, *&c.* Having shewed you how to take any *Angle*, either *within* or on the *outside* of any *Building*, it resteth now that I teach how to *protract* or lay down any *Angle* so taken, upon *Paper*, *Parchment*, or the like.

An Angle being taken as aforesaid, how to Protract, *or lay it down.*

Example 1. *Suppose the* Angle *at* A.

First, Upon your Paper draw a Right Line at pleasure as A E.

Then, out of any Scale, take 5.00 (the Number that you set upon the Walls) and with that Distance, setting one foot of the Compasses in A, with the other describe the obscure Arch p q, and with the same Distance of the Compasses (because the Distance set upon both Walls were equal) one Foot being set in q, with the other describe the obscure Arch t s, crossing the former Arch in the Point O, then through O, draw another Right-Line, as A F; so shall the Angle F A E be equal to the Angle of the Building B A D.

Example

Example 2. *Let it be required to* Protract, *or lay down the* Angle *at* D.

Firſt, Draw a Right-Line at pleaſure, as H L: And upon any part thereof, as at D, make a Point repreſenting the Angle of the Building at D; and becauſe in your Building you ſet 3.50 from D to k, take 3.50 from any Scale, and ſet it from D to l upon your Paper.

Then, from the ſame Scale, take the Diſtance which you meaſured upon the Wall, from D to h, namely 3.0, and with that Diſtance, one Foot being ſet in D, with the other deſcribe an obſcure Arch z z; alſo from the ſame Scale, take 5.30 (the Diſtance which you found in the Building to be between k and h) and ſetting one Foot in I, with the other deſcribe the obſcure Arch y y, croſſing the Arch z z in the Point K, then through this Point K, drawn the Right-Line D G; ſo ſhall the Angle I D G upon the Paper, be equal to the Angle A B C in the Building.

Example 3. *Let it be required to* Protract *the* Outward Angle *at* D.

In the Figure above, the Line D H repreſents the Wall A D, and the Line D G, repreſents the Wall D C, on the Outſides of them; to which two Walls two Rods being applied, and extended 2.00 Foot beyond D, namely, to M and N, the Diſtance between them, *viz.* M and N) being found to be 3.20 Foot, ſet 2.00 from D to M and to N, and then will the Diſtance D M be equal to D P, and D N equal to D R, and M N equal to P R of the *Building*; and conſequently, the *Angle* M D N in the *Draught*, equal to the Angle A D C in the *Building*. And let thus much ſuffice for the *Meaſuring* and *Protracting* of *Lines* and *Angles*, for I intended here not to Treat of *Surveying*, more than ſo much thereof as may be ſerviceable to ſuch as have any concerns in *Building*, or ſetting out *Foundations* for that purpoſe, or to make *Ground-Plots* of *Houſes*, *&c.* already Built.

Here followeth a TABLE *in which by Inſpection only) you may find how many* Square *(or Superficial)* Feet. Yards, Squares, Rods, Quarters *of* Rods, *and* odd Feet, *are contained in any Piece of Artificers Work, the Length and Breadth thereof being given in* Feet.

1 Foot Long, or Broad.

	Feet	Yards		Squares.			Rods.		
	Feet	Y.	F.	S.	Q.	F.	R.	Q.	F.
1	1	0	1	0	0	1	0	0	1
2	2	0	2	0	0	2	0	0	2
3	3	0	3	0	0	3	0	0	3
4	4	0	4	0	0	4	0	0	4
5	5	0	5	0	0	5	0	0	5
6	6	0	6	0	0	6	0	0	6
7	7	0	7	0	0	7	0	0	7
8	8	0	8	0	0	8	0	0	8
9	9	1	0	0	0	9	0	0	9
10	10	1	1	0	0	10	0	0	10
11	11	1	2	0	0	11	0	0	11
12	12	1	3	0	0	12	0	0	12
13	13	1	4	0	0	13	0	0	13
14	14	1	5	0	0	14	0	0	14
15	15	1	6	0	0	15	0	0	15
16	16	1	7	0	0	16	0	0	16
17	17	1	8	0	0	17	One 16 Part.		
18	18	2	0	0	0	18	0	0	18
19	19	2	1	0	0	19	0	0	19
20	20	2	2	0	0	20	0	0	20
21	21	2	3	0	0	21	0	0	21
22	22	2	4	0	0	22	0	0	22
23	23	2	5	0	0	23	0	0	23
24	24	2	6	0	0	24	0	0	24
25	25	2	7	0	1	0	0	0	25
26	26	2	8	0	1	1	0	0	26
27	27	3	0	0	1	2	0	0	27
28	28	3	1	0	1	3	0	0	28
29	29	3	2	0	1	4	0	0	29
30	30	3	3	0	1	5	0	0	30
31	31	3	4	0	1	6	0	0	31
32	32	3	5	0	1	7	0	0	32
33	33	3	6	0	1	8	0	0	33
34	34	3	7	0	1	9	One 8 Part.		
35	35	3	8	0	1	10	0	0	35
36	36	4	0	0	1	11	0	0	36
37	37	4	1	0	1	12	0	0	37
38	38	4	2	0	1	13	0	0	38
39	39	4	3	0	1	14	0	0	39
40	40	4	4	0	1	15	0	0	40
41	41	4	5	0	1	16	0	0	41
42	42	4	6	0	1	17	0	0	42
43	43	4	7	0	1	18	0	0	43
44	44	4	8	0	1	19	0	0	44
45	45	5	0	0	1	20	0	0	45
46	46	5	1	0	1	21	0	0	46
47	47	5	2	0	1	22	0	0	47
48	48	5	3	0	1	23	0	0	48
49	49	5	4	0	1	24	0	0	49
50	50	5	5	0	2	0	0	0	50

1 Foot Long, or Broad.

	Feet	Yards.		Squares.			Rods.		
	Feet	Y.	F.	S.	Q.	F	R.	Q.	F
51	51	5	6	0	2	1	0	0	51
52	52	5	7	0	2	2	0	0	52
53	53	5	8	0	2	3	0	0	53
54	54	6	0	0	2	4	0	0	54
55	55	6	1	0	2	5	0	0	55
56	56	6	2	0	2	6	0	0	56
57	57	6	3	0	2	7	0	0	57
58	58	6	4	0	2	8	0	0	58
59	59	6	5	0	2	9	0	0	59
60	60	6	6	0	2	10	0	0	60
61	61	6	7	0	2	11	0	0	61
62	62	6	8	0	2	12	0	0	62
63	63	7	0	0	2	13	0	0	63
64	64	7	1	0	2	14	0	0	64
65	65	7	2	0	2	15	0	0	65
66	66	7	3	0	2	16	0	0	66
67	67	7	4	0	2	17	0	0	67
68	68	7	5	0	2	18	0	1	0
69	69	7	6	0	2	19	0	1	1
70	70	7	7	0	2	20	0	1	2
71	71	7	8	0	2	21	0	1	3
72	72	8	0	0	2	22	0	1	4
73	73	8	1	0	2	23	0	1	5
74	74	8	2	0	2	24	0	1	6
75	75	8	3	0	3	0	0	1	7
76	76	8	4	0	3	1	0	1	8
77	77	8	5	0	3	2	0	1	9
78	78	8	6	0	3	3	0	1	10
79	79	8	7	0	3	4	0	1	11
80	80	8	8	0	3	5	0	1	12
81	81	9	0	0	3	6	0	1	13
82	82	9	1	0	3	7	0	1	14
83	83	9	2	0	3	8	0	1	15
84	84	9	3	0	3	9	0	1	16
85	85	9	4	0	3	10	0	1	17
86	86	9	5	0	3	11	0	1	18
87	87	9	6	0	3	12	0	1	19
88	88	9	7	0	3	13	0	1	20
89	89	9	8	0	3	14	0	1	21
90	90	10	0	0	3	15	0	1	22
91	91	10	1	0	3	16	0	1	23
92	92	10	2	0	3	17	0	1	24
93	93	10	3	0	3	18	0	1	25
94	94	10	4	0	3	19	0	1	26
95	95	10	5	0	3	20	0	1	27
96	96	10	6	0	3	21	0	1	28
97	97	10	7	0	3	22	0	1	29
98	98	10	8	0	3	23	0	1	30
99	99	11	0	0	3	24	0	1	31
100	100	11	1	1	0	0	0	1	32

2 Foot Long, or Broad

	Feet	Yards.		Squares.			Rods.		
	Feet	Y.	F.	S.	Q.	F.	R.	Q.	F.
1	2	0	2	0	0	2	0	0	2
2	4	0	4	0	0	4	0	0	4
3	6	0	6	0	0	6	0	0	6
4	8	0	8	0	0	8	0	0	8
5	10	1	1	0	0	10	0	0	10
6	12	1	3	0	0	12	0	0	12
7	14	1	5	0	0	14	0	0	14
8	16	1	7	0	0	16	0	0	16
9	18	2	0	0	0	18	0	0	18
10	20	2	2	0	0	20	0	0	20
11	22	2	4	0	0	22	0	0	22
12	24	2	6	0	0	24	0	0	24
13	26	2	8	0	1	1	0	0	26
14	28	3	1	0	1	3	0	0	28
15	30	3	3	0	1	5	0	0	30
16	32	3	5	0	1	7	0	0	32
17	34	3	7	0	1	9	0	0	34
18	36	4	0	0	1	11	0	0	36
19	38	4	2	0	1	13	0	0	38
20	40	4	4	0	1	15	0	0	40
21	42	4	6	0	1	17	0	0	42
22	44	4	8	0	1	19	0	0	44
23	46	5	1	0	1	21	0	0	46
24	48	5	3	0	1	23	0	0	48
25	50	5	5	0	2	0	0	0	50
26	52	5	7	0	2	2	0	0	52
27	54	6	0	0	2	4	0	0	54
28	56	6	2	0	2	6	0	0	56
29	58	6	4	0	2	8	0	0	58
30	60	6	6	0	2	10	0	0	60
31	62	6	8	0	2	12	0	0	62
32	64	7	1	0	2	14	0	0	64
33	66	7	3	0	2	16	0	0	66
34	68	7	5	0	2	18	0	1	0
35	70	7	7	0	2	20	0	1	2
36	72	8	0	0	2	22	0	1	4
37	74	8	2	0	2	24	0	1	6
38	76	8	4	0	3	1	0	1	8
39	78	8	6	0	3	3	0	1	10
40	80	8	8	0	3	5	0	1	12
41	82	9	1	0	3	7	0	1	14
42	84	9	3	0	3	9	0	1	16
43	86	9	5	0	3	11	0	1	18
44	88	9	7	0	3	13	0	1	20
45	90	10	0	0	3	15	0	1	22
46	92	10	2	0	3	17	0	1	24
47	94	10	4	0	3	19	0	1	26
48	96	10	6	0	3	21	0	1	28
49	98	10	8	0	3	23	0	1	30
50	100	11	1	1	0	0	0	1	32

2 Foot Long, or Broad.

	Feet	Yards.		Squares.			Rods.		
	Feet	Y.	F.	S.	Q.	F	R.	Q.	F.
51	102	11	3	1	0	2	0	1	34
52	104	11	5	1	0	4	0	1	36
53	106	17	7	1	0	6	0	1	38
54	108	12	0	1	0	8	0	1	40
55	110	12	2	1	0	10	0	1	42
56	112	12	4	1	0	12	0	1	44
57	114	12	6	1	0	14	0	1	46
58	116	12	8	1	0	16	0	1	48
59	118	13	1	1	0	18	0	1	50
60	120	13	3	1	0	20	0	1	52
61	122	13	5	1	0	22	0	1	54
62	124	13	7	1	0	24	0	1	56
63	126	14	0	1	1	1	0	1	58
64	128	14	2	1	1	3	0	1	60
65	130	14	4	1	1	5	0	1	62
66	132	14	6	1	1	7	0	1	64
67	134	14	8	1	1	9	0	1	66
68	136	15	1	1	1	11	0	2	0
69	138	15	3	1	1	13	0	2	2
70	140	15	5	1	1	15	0	2	4
71	142	15	7	1	1	17	0	2	6
72	144	16	0	1	1	19	0	2	8
73	146	16	2	1	1	21	0	2	10
74	148	16	4	1	1	23	0	2	12
75	150	16	6	1	2	0	0	2	14
76	152	16	8	1	2	2	0	2	16
77	154	17	1	1	2	4	0	2	18
78	156	17	3	1	2	6	0	2	20
79	158	17	5	1	2	8	0	2	22
80	160	17	7	1	2	10	0	2	24
81	162	18	0	1	2	12	0	2	26
82	164	18	2	1	2	14	0	2	28
83	166	18	4	1	2	16	0	2	30
84	168	18	6	1	2	18	0	2	32
85	170	18	8	1	2	20	0	2	34
86	172	19	1	1	2	22	0	2	36
87	174	19	3	1	2	24	0	2	38
88	176	19	5	1	3	1	0	2	40
89	178	19	7	1	3	3	0	2	42
90	180	20	0	1	3	5	0	2	44
91	182	20	2	1	3	7	0	2	46
92	184	20	4	1	3	9	0	2	48
93	186	20	6	1	3	11	0	2	50
94	188	20	8	1	3	13	0	2	52
95	190	21	1	1	3	15	0	2	54
96	192	21	3	1	3	17	0	2	56
97	194	21	5	1	3	19	0	2	58
98	196	21	7	1	3	21	0	2	60
99	198	22	0	1	3	23	0	2	62
100	200	22	2	2	0	0	0	2	64

3 Foot Long, or Broad.

	Feet	Yards.		Squares.			Rods.		
	Feet	Y.	F.	S	Q.	F.	R.	Q.	F.
1	3	0	3	0	0	3	0	0	3
2	6	0	6	0	0	6	0	0	6
3	9	1	0	0	0	9	0	0	9
4	12	1	3	0	0	12	0	0	12
5	15	1	6	0	0	15	0	0	15
6	18	2	0	0	0	18	0	0	18
7	21	2	3	0	0	21	0	0	21
8	24	2	6	0	0	24	0	0	24
9	27	3	0	0	1	2	0	0	27
10	30	3	3	0	1	5	0	0	30
11	33	3	6	0	1	8	0	0	33
12	36	4	0	0	1	11	0	0	36
13	39	4	3	0	1	14	0	0	39
14	42	4	6	0	1	17	0	0	42
15	45	5	0	0	1	20	0	0	45
16	48	5	3	0	1	23	0	0	48
17	51	5	6	0	2	1	0	0	51
18	54	6	0	0	2	4	0	0	54
19	57	6	3	0	2	7	0	0	57
20	60	6	6	0	2	10	0	0	60
21	63	7	0	0	2	13	0	0	63
22	66	7	3	0	2	16	0	0	66
23	69	7	6	0	2	19	0	1	1
24	72	8	0	0	2	22	0	1	4
25	75	8	3	0	3	0	0	1	7
26	78	8	6	0	3	3	0	1	10
27	81	9	0	0	3	6	0	1	13
28	84	9	3	0	3	9	0	1	16
29	87	9	6	0	3	12	0	1	19
30	90	10	0	0	3	15	0	1	22
31	93	10	3	0	3	18	0	1	25
32	96	10	6	0	3	21	0	1	28
33	99	11	0	0	3	24	0	1	31
34	102	11	3	1	0	2	0	1	34
35	105	11	6	1	0	5	0	1	37
36	108	12	0	1	0	8	0	1	40
37	111	12	3	1	0	11	0	1	43
38	114	12	6	1	0	14	0	1	46
39	117	13	0	1	0	17	0	1	49
40	120	13	3	1	0	20	0	1	52
41	123	13	6	1	0	23	0	1	55
42	126	14	0	1	1	1	0	1	58
43	129	14	3	1	1	4	0	1	61
44	132	14	6	1	1	7	0	1	64
45	135	15	0	1	1	10	0	1	67
46	138	15	3	1	1	13	0	2	2
47	141	15	6	1	1	16	0	2	5
48	144	16	0	1	1	19	0	2	8
49	147	16	3	1	1	22	0	2	11
50	150	16	6	1	2	0	0	2	14

3 Foot Long, or Broad.

	Feet	Yards.		Squares.			Rods.		
	Feet	Y.	F.	S.	Q.	F.	R.	Q.	F
51	153	17	0	1	2	3	0	2	17
52	156	17	3	1	2	6	0	2	20
53	159	17	6	1	2	9	0	2	23
54	162	18	0	1	2	12	0	2	26
55	165	18	3	1	2	15	0	2	29
56	168	18	6	1	2	18	0	2	32
57	171	19	0	1	2	21	0	2	35
58	174	19	3	1	2	24	0	2	38
59	177	19	6	1	3	2	0	2	41
60	180	20	0	1	3	5	0	2	44
61	183	20	3	1	3	8	0	2	47
62	186	20	6	1	3	11	0	2	50
63	189	21	0	1	3	14	0	2	53
64	192	21	3	1	3	17	0	2	56
65	195	21	6	1	3	20	0	2	59
66	198	22	0	1	3	23	0	2	62
67	201	22	3	2	0	1	0	2	65
68	204	22	6	2	0	4	0	3	0
69	207	23	0	2	0	7	0	3	3
70	210	23	3	2	0	10	0	3	6
71	213	23	6	2	0	13	0	3	9
72	216	24	0	2	0	16	0	3	12
73	219	24	3	2	0	19	0	3	15
74	222	24	6	2	0	22	0	3	18
75	225	25	0	2	1	0	0	3	21
76	228	25	3	2	1	3	0	3	24
77	231	25	6	2	1	6	0	3	27
78	234	26	0	2	1	9	0	3	30
79	237	26	3	2	1	12	0	3	33
80	240	26	6	2	1	15	0	3	36
81	243	27	0	2	1	18	0	3	39
82	246	27	3	2	1	21	0	3	42
83	249	27	6	2	1	24	0	3	45
84	252	28	0	2	2	2	0	3	48
85	255	28	3	2	2	5	0	3	51
86	258	28	6	2	2	8	0	3	54
87	261	29	0	2	2	11	0	3	57
88	264	29	3	2	2	14	0	3	60
89	267	29	6	2	2	17	0	3	63
90	270	30	0	2	2	20	0	3	66
91	273	30	3	2	2	23	1	0	1
92	276	30	6	2	3	1	1	0	4
93	279	31	0	2	3	4	1	0	7
94	280	31	3	2	3	7	1	0	10
95	285	31	6	2	3	10	1	0	13
96	288	32	0	2	3	13	1	0	16
97	291	32	3	2	3	16	1	0	19
98	294	32	6	2	3	19	1	0	12
99	297	33	0	2	3	22	1	0	25
100	300	33	3	3	0	0	1	0	28

4 Foot Long, or Broad

	Feet	Yards.		Squares.			Rods.		
	Feet	Y.	F.	S.	Q.	F.	R.	Q.	F.
1	4	0	4	0	0	4	0	0	4
2	8	0	8	0	0	8	0	0	8
3	12	1	3	0	0	12	0	0	12
4	16	1	7	0	0	16	0	0	16
5	20	2	2	0	0	20	0	0	20
6	24	2	6	0	0	24	0	0	24
7	28	3	1	0	1	3	0	0	28
8	32	3	5	0	1	7	0	0	32
9	36	4	0	0	1	11	0	0	36
10	40	4	4	0	1	15	0	0	40
11	44	4	8	0	1	19	0	0	44
12	48	5	3	0	1	23	0	0	48
13	52	5	7	0	2	2	0	0	52
14	56	6	2	0	2	6	0	0	56
15	60	6	6	0	2	10	0	0	60
16	64	7	1	0	2	14	0	0	64
17	68	7	5	0	2	18	0	1	0
18	72	8	0	0	2	22	0	1	4
19	76	8	4	0	3	1	0	1	8
20	80	8	8	0	3	5	0	1	12
21	84	9	3	0	3	9	0	1	16
22	88	9	7	0	3	13	0	1	20
23	92	10	2	0	3	17	0	1	24
24	96	10	6	0	3	21	0	1	28
25	100	11	1	1	0	0	0	1	32
26	104	11	5	1	0	4	0	1	36
27	108	12	0	1	0	8	0	1	40
28	112	12	4	1	0	12	0	1	44
29	116	12	8	1	0	16	0	1	48
30	120	13	3	1	0	20	0	1	52
31	124	13	7	1	0	24	0	1	56
32	128	14	2	1	1	3	0	1	60
33	132	14	6	1	1	7	0	1	64
34	136	15	1	1	1	11	0	2	0
35	140	15	5	1	1	15	0	2	4
36	144	16	0	1	1	19	0	2	8
37	148	16	4	1	1	23	0	2	12
38	152	16	8	1	2	2	0	2	16
39	156	17	3	1	2	6	0	2	20
40	160	17	7	1	2	10	0	2	24
41	164	18	2	1	2	14	0	2	28
42	168	18	6	1	2	18	0	2	32
43	172	19	1	1	2	22	0	2	36
44	176	19	5	1	3	1	0	2	40
45	180	20	0	1	3	5	0	2	44
46	184	20	4	1	3	9	0	2	48
47	188	20	8	1	3	13	0	2	52
48	192	21	3	1	3	17	0	2	56
49	196	21	7	1	3	21	0	2	60
50	200	22	2	2	0	0	0	2	64

4 Foot Long, or Broad.

	Feet	Yards.		Squares.			Rods.		
	Feet	Y.	F.	S.	Q.	F.	R.	Q.	F.
51	204	22	6	2	0	4	0	3	0
52	208	23	1	2	0	8	0	3	4
53	212	23	5	2	0	12	0	3	8
54	216	24	0	2	0	16	0	3	12
55	220	24	4	2	0	20	0	3	16
56	224	24	8	2	0	24	0	3	20
57	228	25	3	2	1	3	0	3	24
58	232	25	7	2	1	7	0	3	28
59	236	26	2	2	1	11	0	3	32
60	240	26	6	2	1	15	0	3	36
61	244	27	1	2	1	19	0	3	40
62	248	27	5	2	1	23	0	3	44
63	252	28	0	2	2	2	0	3	48
64	256	28	4	2	2	6	0	3	52
65	260	28	8	2	2	10	0	3	56
66	264	29	3	2	2	14	0	3	60
67	268	29	7	2	2	18	0	3	64
68	272	30	2	2	2	22	1	0	0
69	276	30	6	2	3	1	1	0	4
70	280	31	1	2	3	5	1	0	8
71	284	31	5	2	3	9	1	0	12
72	288	32	0	2	3	13	1	0	16
73	292	32	4	2	3	17	1	0	20
74	296	32	8	2	3	21	1	0	24
75	300	33	3	3	0	0	1	0	28
76	304	33	7	3	0	4	1	0	32
77	308	34	2	3	0	8	1	0	36
78	312	34	6	3	0	12	1	0	40
79	316	35	1	3	0	16	1	0	44
80	320	35	5	3	0	20	1	0	48
81	324	36	0	3	0	24	1	0	52
82	328	36	4	3	1	3	1	0	56
83	332	36	8	3	1	7	1	0	60
84	336	37	3	3	1	11	1	0	64
85	340	37	7	3	1	13	1	1	0
86	344	38	2	3	1	19	1	1	4
87	348	38	6	3	1	23	1	1	8
88	352	39	1	3	2	2	1	1	16
89	356	39	5	3	2	6	1	1	12
90	360	40	0	3	2	19	1	1	20
91	364	40	4	3	2	14	1	1	24
92	368	40	8	3	2	18	1	1	28
93	372	41	3	3	2	22	1	1	32
94	376	41	7	3	3	1	1	1	36
95	380	42	2	3	3	5	1	1	40
96	384	42	6	3	3	9	1	1	44
97	388	43	1	3	3	13	1	1	48
98	392	43	5	3	3	17	1	1	52
99	396	44	0	3	4	21	1	1	56
100	400	44	4	4	0	0	1	1	60

5 Foot Long, or Broad.

	Feet	Yards.		Squares.			Rods.		
	Feet	Y.	F.	S.	Q.	F.	R.	Q.	F.
1	5	0	5	0	0	5	0	0	5
2	10	1	1	0	0	10	0	0	10
3	15	1	6	0	0	15	0	0	15
4	20	2	2	0	0	20	0	0	20
5	25	2	7	0	1	0	0	0	25
6	30	3	3	0	1	5	0	0	30
7	35	3	8	0	1	10	0	0	35
8	40	4	4	0	1	15	0	0	40
9	55	5	0	0	1	20	0	0	45
10	50	5	5	0	2	0	0	0	50
11	55	6	1	0	2	5	0	0	55
12	60	6	6	0	2	10	0	0	60
13	65	7	2	0	2	15	0	0	65
14	70	7	7	0	2	20	0	1	2
15	75	8	9	0	3	0	0	1	7
16	80	8	8	0	3	5	0	1	12
17	85	9	4	0	3	10	0	1	17
18	90	10	0	0	3	15	0	1	22
19	95	10	5	0	3	20	0	1	27
20	100	11	1	1	0	0	0	1	32
21	105	11	6	1	0	5	0	1	37
22	110	12	2	1	0	10	0	1	42
23	115	12	7	1	0	15	0	1	47
24	120	13	3	1	0	20	0	1	52
25	125	13	8	1	1	0	0	1	57
26	130	14	4	1	1	5	0	1	62
27	135	15	0	1	1	10	0	1	67
28	140	15	5	1	1	15	0	2	4
29	145	16	1	1	1	20	0	2	9
30	150	16	6	1	2	0	0	2	14
31	155	17	2	1	2	5	0	2	19
32	160	17	7	1	2	10	0	2	24
33	165	18	3	1	2	15	0	2	29
34	170	18	8	1	2	20	0	2	34
35	175	19	4	1	3	0	0	2	39
36	180	20	0	1	3	5	0	2	44
37	185	20	5	1	3	10	0	2	49
38	190	21	1	1	3	15	0	2	54
39	195	21	6	1	3	20	0	2	59
40	200	22	2	2	0	0	0	2	64
41	205	22	7	2	0	5	0	3	1
42	210	23	3	2	0	10	0	3	6
43	215	23	8	2	0	15	0	3	11
44	220	24	4	2	0	20	0	3	16
45	225	25	0	2	1	0	0	3	21
46	230	25	5	2	1	5	0	3	26
47	235	26	1	2	1	10	0	3	31
48	240	26	6	2	1	15	0	3	36
49	245	27	2	2	1	20	0	3	41
50	250	27	7	2	2	0	0	3	46

5 Foot Long, or Broad.

	Feet	Yards.		Squares.			Rods.		
	Feet	Y.	F.	S.	Q.	F.	R.	Q.	F.
51	255	28	3	2	2	5	0	3	51
52	260	28	8	2	2	10	0	3	56
53	265	29	4	2	2	15	0	3	61
54	270	30	0	2	2	20	0	3	66
55	275	30	5	2	3	0	0	0	3
56	280	31	1	2	3	5	1	0	8
57	285	31	6	2	3	10	1	0	13
58	290	32	2	2	3	15	1	0	18
59	295	32	7	2	3	20	1	0	23
60	300	33	3	3	0	0	1	0	28
61	305	33	8	3	0	5	1	0	33
62	310	34	4	3	0	10	1	0	38
63	315	35	0	3	0	15	1	0	43
64	320	35	5	3	0	20	1	0	48
65	325	36	1	3	1	0	1	0	53
66	330	36	6	3	1	5	1	0	58
67	335	37	2	3	1	10	1	0	63
68	340	37	7	3	1	15	1	1	0
69	345	38	3	3	1	20	1	1	5
70	350	38	8	3	2	0	1	1	10
71	355	39	4	3	2	5	1	1	15
72	360	40	0	3	2	10	1	1	20
73	365	40	5	3	2	15	1	1	25
74	370	41	1	3	2	20	1	1	30
75	375	41	6	3	3	0	1	1	35
76	380	42	2	3	3	5	1	1	40
77	385	42	7	3	3	10	1	1	45
78	390	43	3	3	3	15	1	1	50
79	395	43	8	3	3	20	1	1	55
80	400	44	4	4	0	0	1	1	65
81	405	45	0	4	0	5	1	1	65
82	410	45	5	4	0	10	1	2	2
83	415	45	1	4	0	15	1	2	7
84	420	46	6	4	0	20	1	2	12
85	425	47	2	4	1	0	1	2	17
86	430	47	7	4	1	5	1	2	22
87	435	48	3	4	1	10	1	2	27
88	440	48	8	4	1	15	1	2	32
89	445	49	4	4	1	20	1	2	37
90	450	50	0	4	2	0	1	2	42
91	455	50	5	4	2	5	1	2	47
92	460	51	1	4	2	10	1	2	57
93	465	51	6	4	2	15	1	2	57
94	470	52	2	4	2	20	1	2	62
95	475	52	7	4	3	0	1	2	67
96	480	53	3	4	3	5	1	3	4
97	485	53	8	4	3	10	1	3	9
98	490	54	4	4	3	15	1	3	14
99	495	55	0	4	3	20	1	3	19
100	500	55	5	5	0	0	1	3	24

6 Foot Long, or Broad

	Feet	Yards.		Squares.			Rods.		
	Feet	Y.	F.	S.	Q.	F.	R.	Q.	F.
1	6	0	6	0	0	6	0	0	6
2	12	1	3	0	0	12	0	0	12
3	18	2	0	0	0	18	0	0	18
4	24	2	6	0	0	24	0	0	24
5	30	3	3	0	1	5	0	0	30
6	36	4	0	0	1	11	0	0	36
7	42	4	6	0	1	17	0	0	42
8	48	5	3	0	1	23	0	0	48
9	54	6	0	0	2	4	0	0	54
10	60	6	6	0	2	10	0	0	60
11	66	7	3	0	2	16	0	0	66
12	72	8	0	0	2	22	0	1	4
13	78	8	6	0	2	3	0	1	10
14	84	9	3	0	3	9	0	1	16
15	90	10	0	0	3	15	0	1	22
16	96	10	6	0	3	21	0	1	28
17	102	11	3	1	3	2	0	1	34
18	108	12	0	1	3	8	0	1	40
19	114	12	6	1	3	14	0	1	46
20	120	13	3	1	3	20	0	1	52
21	126	14	0	1	1	1	0	1	58
22	132	14	6	1	1	7	0	1	64
23	138	15	3	1	1	13	0	2	2
24	144	16	0	1	1	19	0	2	8
25	150	16	6	1	2	0	0	2	14
26	156	17	3	1	2	6	0	2	20
27	162	18	0	1	2	12	0	2	26
28	168	18	6	1	2	18	0	2	32
29	174	19	3	1	2	24	0	2	38
30	180	20	0	1	3	5	0	2	44
31	186	20	6	1	3	11	0	2	50
32	192	21	3	1	3	17	0	2	56
33	198	22	0	1	3	23	0	2	62
34	204	22	6	2	0	4	0	3	0
35	210	23	3	2	0	10	0	3	6
36	216	24	0	2	0	16	0	3	12
37	222	24	6	2	0	22	0	3	18
38	228	25	3	2	1	3	0	3	24
39	234	26	0	2	1	9	0	3	30
40	240	26	6	2	1	15	0	3	36
41	246	27	3	2	1	21	0	3	42
42	252	28	0	2	2	2	0	3	48
43	258	28	6	2	2	18	0	3	54
44	264	29	3	2	2	4	0	3	60
45	270	30	0	2	2	20	0	3	66
46	276	40	6	2	3	1	1	0	4
47	282	31	3	2	3	7	1	0	10
48	288	32	0	2	3	13	1	0	16
49	294	32	6	2	3	19	1	0	22
50	300	33	3	3	0	0	1	0	28

6 Foot Long, or Broad.

	Feet	Yards.		Squares.			Rods.		
	Feet	Y.	F.	S.	Q.	F.	R.	Q.	F.
51	306	34	0	3	0	6	1	0	34
52	312	34	6	3	0	12	1	0	40
53	318	35	3	3	0	18	1	0	46
54	324	36	0	3	0	24	1	0	52
55	330	36	6	3	1	5	1	0	58
56	336	37	3	3	1	11	1	0	
57	342	38	0	3	1	17	1	1	
58	348	38	6	3	1	23	1	1	8
59	354	39	3	3	2	4	1	1	14
60	360	40	0	3	2	10	1	1	20
61	366	40	6	3	2	16	1	1	26
62	372	41	3	3	2	22	1	1	32
63	378	42	0	3	3	3	1	1	38
64	384	42	6	3	3	9	1	1	44
65	390	43	3	3	3	15	1	1	50
66	396	44	0	3	3	21	1	1	56
67	402	44	6	4	0	2	1	1	62
68	408	45	3	4	0	8	1	2	0
69	414	46	0	4	0	14	1	2	6
70	420	46	6	4	0	20	1	2	12
71	426	47	3	4	1	1	1	2	18
72	432	48	0	4	1	7	1	2	24
73	438	48	6	4	1	13	1	2	30
74	444	49	3	4	1	19	1	2	36
75	450	50	0	4	2	0	1	2	42
76	456	50	6	4	2	6	1	2	48
77	462	51	3	4	2	12	1	2	54
78	468	52	0	4	2	18	1	2	60
79	474	52	6	4	2	24	1	2	66
80	480	53	3	4	3	5	1	3	4
81	486	54	0	4	3	11	1	3	10
82	492	54	6	4	3	17	1	3	16
83	498	55	3	4	3	23	1	3	22
84	504	56	0	5	0	4	1	3	28
85	510	56	6	5	0	10	1	3	34
86	516	57	3	5	0	16	1	3	40
87	522	58	0	5	0	22	1	3	46
88	528	58	6	5	1	3	1	3	52
89	534	59	3	5	1	9	1	3	58
90	540	60	0	5	1	15	1	3	64
91	546	60	6	5	1	21	2	0	2
92	552	61	3	5	2	2	2	0	8
93	558	62	0	5	2	8	2	0	14
94	564	62	6	5	2	14	2	0	20
95	570	63	3	5	2	20	2	0	26
96	576	64	0	5	3	1	2	0	32
97	582	64	6	5	3	7	2	0	38
98	588	65	3	5	3	13	2	0	44
99	594	66	0	5	3	19	2	0	50
100	600	66	6	6	0	0	2	0	56

7 Foot Long, or Broad.

	Feet	Yards.		Squares.			Rods.		
	Feet	Y.	F.	S.	Q.	F.	R.	Q.	F.
1	7	0	7	0	0	7	0	0	7
2	14	1	5	0	0	14	0	0	17
3	21	2	3	0	0	21	0	0	21
4	28	3	1	0	1	3	0	0	28
5	35	3	8	0	1	10	0	0	35
6	42	4	6	0	1	17	0	0	42
7	49	5	4	0	1	24	0	0	49
8	56	6	2	0	2	6	0	0	56
9	63	7	0	0	2	13	0	0	63
10	70	7	7	0	2	20	0	1	2
11	77	8	5	0	3	2	0	1	9
12	84	9	3	0	3	9	0	1	16
13	91	10	1	0	3	16	0	1	23
14	98	10	8	0	3	23	0	1	30
15	105	11	6	1	0	5	0	1	37
16	112	12	4	1	0	12	0	1	44
17	119	13	2	1	0	19	0	1	51
18	126	14	0	1	1	1	0	1	58
19	133	14	7	1	1	8	0	1	65
20	140	15	5	1	1	15	0	2	4
21	147	16	3	1	1	22	0	2	11
22	154	17	1	1	2	4	0	2	18
23	161	17	8	1	2	11	0	2	25
24	168	18	6	1	2	18	0	2	32
25	175	19	4	1	3	0	0	2	39
26	182	20	2	1	3	7	0	2	46
27	189	21	0	1	3	14	0	2	53
28	196	21	7	1	3	21	0	2	60
29	203	22	5	2	0	3	0	2	67
30	210	23	3	2	0	10	0	3	6
31	217	24	1	2	0	17	0	3	13
32	224	24	8	2	0	24	0	3	20
33	231	25	6	2	1	6	0	3	27
34	238	26	4	2	1	13	0	3	34
35	245	27	2	2	1	20	0	3	41
36	252	28	0	2	2	2	0	3	48
37	259	28	7	2	2	9	0	3	55
38	266	29	5	2	2	16	0	3	62
39	273	30	3	2	2	23	1	0	1
40	280	31	1	2	3	5	1	0	8
41	287	31	8	2	3	12	1	0	15
42	294	32	6	2	3	19	1	0	22
43	301	33	4	3	0	1	1	0	29
44	308	34	2	3	0	8	1	0	36
45	315	35	0	3	0	15	1	0	43
46	322	35	7	3	0	22	1	0	50
47	329	36	5	3	1	4	1	0	57
48	336	37	3	3	1	11	1	0	64
49	343	38	1	3	1	18	1	1	3
50	350	38	8	3	2	0	1	1	10

7 Foot Long, or Broad.

	Feet	Yards.		Squares.			Rods.		
	Feet	Y.	F.	S.	Q.	F.	R.	Q.	F.
51	357	39	6	3	2	7	1	1	17
52	364	40	4	3	2	14	1	1	24
53	371	41	2	3	2	21	1	1	31
54	378	42	0	3	3	3	1	1	38
55	385	42	7	3	3	10	1	1	45
56	392	43	5	3	3	17	1	1	52
57	399	44	3	3	3	24	1	1	59
58	406	45	1	4	0	6	1	1	66
59	413	45	8	4	0	13	1	2	5
60	420	46	6	4	0	20	1	2	12
61	427	47	4	4	1	2	1	2	19
62	434	48	2	4	1	9	1	2	26
63	441	49	0	4	1	16	1	2	33
64	448	49	7	4	1	23	1	2	40
65	455	50	5	4	2	5	1	2	47
66	462	51	3	4	2	12	1	2	54
67	469	52	1	4	2	19	1	2	61
68	476	52	8	4	3	1	1	3	0
69	483	53	6	4	3	8	1	3	7
70	490	54	4	4	3	15	1	3	14
71	497	55	2	4	3	22	1	3	21
72	504	56	0	5	0	4	1	3	28
73	511	56	7	5	0	11	1	3	35
74	518	57	5	5	0	18	1	3	42
75	525	58	3	5	1	0	1	3	49
76	532	59	1	5	1	7	1	3	56
77	539	59	8	5	1	14	1	3	63
78	546	60	6	5	1	21	2	0	2
79	553	61	4	5	2	3	2	0	9
80	560	62	2	5	2	10	2	0	16
81	567	63	0	5	2	17	2	0	23
82	574	63	7	5	2	24	2	0	30
83	581	64	5	5	3	6	2	0	37
84	588	65	3	5	3	13	2	0	44
85	595	66	1	5	3	20	2	0	51
86	602	66	8	6	0	2	2	0	58
87	609	67	6	6	0	9	2	0	65
88	616	68	4	6	0	16	2	1	4
89	623	69	2	6	0	23	2	1	11
90	630	70	0	6	1	5	2	1	18
91	637	70	7	6	1	12	2	1	25
92	644	71	5	6	1	19	2	1	32
93	651	72	3	6	2	1	2	1	39
94	658	73	1	6	2	2	2	1	46
95	665	74	8	6	2	15	2	1	53
96	672	74	6	6	2	22	2	1	60
97	679	75	4	6	3	4	2	1	67
98	686	76	2	6	3	11	2	2	6
99	693	77	0	6	3	18	2	2	13
100	700	77	7	7	0	0	2	2	20

8 Foot Long, or Broad.

	Feet	Yards.		Squares.			Rods.		
	Feet	Y.	F.	S.	Q.	F.	R.	Q.	F.
1	8	0	8	0	0	8	0	0	8
2	16	1	7	0	0	16	0	0	16
3	24	2	6	0	0	24	0	0	24
4	32	3	5	0	1	7	0	0	32
5	40	4	4	0	1	15	0	0	40
6	48	5	3	0	1	22	0	0	48
7	56	6	2	0	2	6	0	0	56
8	64	7	1	0	2	14	0	0	64
9	72	8	0	0	2	22	0	1	4
10	80	8	8	0	3	5	0	1	12
11	88	9	7	0	3	13	0	1	20
12	96	10	6	0	3	21	0	1	28
13	104	11	5	1	0	4	0	1	36
14	112	12	4	1	0	12	0	1	44
15	120	13	3	1	0	20	0	1	52
16	128	14	2	1	1	3	0	1	60
17	136	15	1	1	1	11	0	2	0
18	144	16	0	1	1	19	0	2	8
19	152	16	8	1	2	2	0	2	16
20	160	17	7	1	2	10	0	2	24
21	168	18	6	1	2	18	0	2	32
22	176	19	5	1	3	1	0	2	40
23	184	20	4	1	3	9	0	2	48
24	192	21	3	1	3	17	0	2	56
25	200	22	2	2	0	0	0	2	64
26	208	23	1	2	0	8	0	3	4
27	216	24	0	2	0	16	0	3	12
28	224	24	8	2	0	24	0	3	20
29	232	25	7	2	1	7	0	3	28
30	240	26	6	2	1	15	0	3	36
31	248	27	5	2	1	22	0	3	44
32	256	28	4	2	2	6	0	3	52
33	264	29	3	2	2	14	0	3	60
34	272	30	2	2	2	22	1	0	0
35	280	31	1	2	3	5	1	0	8
36	288	32	0	2	3	13	1	0	16
37	296	32	8	2	3	21	1	0	24
38	304	33	7	3	0	4	1	0	32
39	312	34	6	3	0	12	1	0	40
40	320	35	5	3	0	20	1	0	48
41	328	36	4	3	1	3	1	0	56
42	336	37	3	3	1	11	1	0	64
43	344	38	2	3	1	19	1	1	4
44	352	39	1	3	2	2	1	1	12
45	360	40	0	3	2	10	1	1	20
46	368	40	8	3	2	18	1	1	28
47	376	41	7	3	3	1	1	1	36
48	384	42	6	3	3	9	1	1	44
49	392	43	5	3	3	17	1	1	52
50	400	44	4	4	0	0	1	1	60

8 Foot Long, or Broad.

	Feet	Yards.		Squares.			Rods.		
	Feet	T.	F.	S.	Q.	F.	R.	Q.	F.
51	408	45	3	4	0	8	1	2	0
52	416	46	2	4	0	16	1	2	8
53	424	47	1	4	0	24	1	2	16
54	432	48	0	4	1	7	1	2	24
55	440	48	8	4	1	15	1	2	32
56	448	49	7	4	1	23	1	2	40
57	456	50	6	4	2	6	1	2	48
58	464	51	5	4	2	14	1	2	56
59	472	52	4	4	2	22	1	2	64
60	480	53	3	4	3	5	1	3	4
61	488	54	2	4	3	13	1	3	12
62	496	55	1	4	3	21	1	3	20
63	504	56	0	5	0	4	1	3	28
64	512	56	7	5	0	12	1	3	36
65	520	57	8	5	0	20	1	3	44
66	528	58	5	5	1	3	1	3	52
67	536	59	6	5	1	11	1	3	60
68	544	60	4	5	1	19	2	0	0
69	552	61	3	5	2	2	2	0	8
70	560	62	2	5	2	10	2	0	16
71	568	63	1	5	2	18	2	0	24
72	576	64	0	5	3	1	2	0	32
73	584	64	8	5	3	9	2	0	40
74	592	65	7	5	3	17	2	0	48
75	600	66	6	6	0	0	2	0	56
76	608	67	5	6	0	8	2	0	64
77	616	68	4	6	0	16	2	1	4
78	624	69	3	6	0	24	2	1	12
79	632	70	2	6	1	7	2	1	20
80	640	71	1	6	1	18	2	1	28
81	648	72	0	6	1	22	2	1	36
82	656	72	8	6	2	6	2	1	44
83	664	73	7	6	2	14	2	1	52
84	672	74	6	6	2	22	2	1	60
85	680	75	5	6	3	5	2	2	0
86	688	76	4	6	3	13	2	2	8
87	696	77	3	6	3	21	2	2	16
88	704	78	2	7	0	4	2	2	24
89	712	79	1	7	0	12	2	2	32
90	720	80	0	7	0	20	2	2	40
91	728	80	8	7	1	3	2	2	48
92	736	81	7	7	1	11	2	2	56
93	744	82	6	7	1	19	2	2	64
94	752	83	5	7	2	2	2	3	4
95	760	84	4	7	2	10	2	3	12
96	768	85	3	7	2	18	2	3	20
97	776	86	2	7	3	1	2	3	28
98	784	97	1	7	3	9	2	3	36
99	792	98	0	7	3	17	2	3	44
100	800	98	8	8	0	0	2	3	52

9 Foot Long, or Broad.

	Feet	Yards.		Squares.			Rods.		
	Feet	Y.	F.	S.	Q.	F.	R.	Q.	F.
1	9	1	0	0	0	9	0	0	9
2	18	2	0	0	0	18	0	0	18
3	27	3	0	0	1	2	0	0	27
4	36	4	0	0	1	11	0	0	36
5	45	5	0	0	1	20	0	0	45
6	54	6	0	0	2	4	0	0	54
7	63	7	0	0	2	13	0	0	63
8	72	8	0	0	2	22	0	1	4
9	81	9	0	0	3	6	0	1	13
10	90	10	0	0	3	15	0	1	22
11	99	11	0	0	3	24	0	1	31
12	108	12	0	1	0	8	0	1	40
13	117	13	0	1	0	17	0	1	49
14	126	14	0	1	1	1	0	1	58
15	135	15	0	1	1	10	0	1	67
16	144	16	0	1	1	19	0	2	8
17	153	17	0	1	2	3	0	2	17
18	162	18	0	1	2	12	0	2	26
19	171	19	0	1	2	21	0	2	35
20	180	20	0	1	3	5	0	2	44
21	189	21	0	1	3	14	0	2	53
22	198	22	0	1	3	23	0	2	62
23	207	23	0	2	0	7	0	3	3
24	216	24	0	2	0	16	0	3	12
25	225	25	0	2	1	0	0	3	21
26	234	26	0	2	1	9	0	3	30
27	243	27	0	2	1	18	0	3	39
28	252	28	0	2	2	2	0	3	48
29	261	29	0	2	2	11	0	3	57
30	270	30	0	2	2	20	0	3	66
31	279	31	0	2	3	4	1	0	7
32	288	32	0	2	3	13	1	0	16
33	292	33	0	2	3	22	1	0	25
34	306	34	0	3	0	6	1	0	34
35	315	35	0	3	0	15	1	0	43
36	324	36	0	3	0	24	1	0	52
37	333	37	0	3	1	8	1	0	61
38	342	38	0	3	1	17	1	1	2
39	351	39	0	3	2	1	1	1	11
40	360	40	0	3	2	10	1	1	20
41	369	41	0	3	2	19	1	1	29
42	378	42	0	3	3	3	1	1	38
43	387	43	0	3	3	12	1	1	46
44	396	44	0	3	2	21	1	1	57
45	405	45	0	4	0	5	1	1	65
46	414	46	0	4	0	14	1	2	6
47	423	47	0	4	0	23	1	2	15
48	432	48	0	4	1	7	1	2	24
49	441	49	0	4	1	16	1	2	33
50	450	50	0	4	2	0	1	2	42

9 Foot Long, or Broad.

	Feet	Yards.		Squares.			Rods.		
	Feet	Y.	F.	S.	Q.	F.	R.	Q.	F.
51	459	51	0	4	2	9	1	2	51
52	468	52	0	4	2	18	1	2	60
53	477	53	0	4	3	2	1	3	1
54	486	54	0	4	3	11	1	3	10
55	495	55	0	4	3	20	1	3	19
56	504	56	0	5	0	4	1	3	28
57	513	57	0	5	0	13	1	3	37
58	522	58	0	5	0	22	1	3	46
59	531	59	0	5	1	6	1	3	55
60	540	60	0	5	1	15	1	3	64
61	549	61	0	5	1	24	2	0	4
62	558	62	0	5	2	8	2	0	13
63	567	63	0	5	2	17	2	0	22
64	576	64	0	5	3	1	2	0	31
65	585	65	0	5	3	10	2	0	40
66	594	66	0	5	3	19	2	0	49
67	603	67	0	6	0	3	2	0	58
68	612	68	0	6	0	12	2	0	67
69	621	69	0	6	0	21	2	1	8
70	630	70	0	6	1	5	2	1	17
71	639	71	0	6	1	14	2	1	26
72	648	72	0	6	1	23	2	1	35
73	657	73	0	6	2	7	2	1	44
74	666	74	0	6	2	16	2	1	53
75	675	75	0	6	3	0	2	1	62
76	684	76	0	6	3	9	2	2	4
77	693	77	0	6	3	18	2	2	13
78	702	78	0	7	0	2	2	2	22
79	711	79	0	7	0	11	2	2	31
80	720	80	0	7	0	20	2	2	40
81	729	81	0	7	1	4	2	2	49
82	738	82	0	7	1	13	2	2	58
83	747	83	0	7	1	22	2	2	67
84	756	84	0	7	2	6	2	3	8
85	765	85	0	7	2	15	2	3	17
86	774	86	0	7	2	24	2	3	26
87	783	87	0	7	3	8	2	3	35
88	792	88	0	7	3	17	2	3	44
89	801	89	0	8	0	1	2	3	53
90	810	90	0	8	0	10	2	3	62
91	819	91	0	8	0	19	3	0	3
92	828	92	0	8	1	3	3	0	12
93	837	93	0	8	1	12	3	0	21
94	846	94	0	8	1	21	3	0	30
95	855	95	0	8	2	5	3	0	39
96	864	96	0	8	2	14	3	0	48
97	873	97	0	8	2	23	3	0	57
98	881	98	0	8	3	7	3	0	66
99	891	99	0	8	3	16	3	1	7
100	900	100	0	9	0	0	3	1	16

10 Foot Long, or Broad.

	Feet	Yards.		Squares.			Rods.		
	Feet	Y.	F.	S.	Q.	F.	R.	Q.	F.
1	10	1	1	0	0	10	0	0	10
2	20	2	2	0	0	20	0	0	20
3	30	3	3	0	1	5	0	0	30
4	40	4	4	0	1	10	0	0	40
5	50	5	5	0	2	0	0	0	50
6	60	6	6	0	2	10	0	0	60
7	70	7	7	0	2	20	0	1	2
8	80	8	8	0	3	5	0	1	12
9	90	10	0	0	3	15	0	1	22
10	100	11	1	1	0	0	0	1	32
11	110	12	2	1	0	10	0	1	42
12	120	13	3	1	0	20	0	1	52
13	130	14	4	1	1	5	0	1	62
14	140	15	5	1	1	10	0	2	4
15	150	16	6	1	2	0	0	2	14
16	160	17	7	1	2	10	0	2	24
17	170	18	8	1	2	20	0	2	34
18	180	20	0	1	3	5	0	2	44
19	190	21	1	1	3	15	0	2	54
20	200	22	2	2	0	0	0	2	64
21	210	23	3	2	0	10	0	3	6
22	220	24	4	2	0	20	0	3	16
23	230	25	5	2	1	5	0	3	26
24	240	26	6	2	1	15	0	3	36
25	250	27	7	2	2	0	0	3	46
26	260	28	8	2	2	10	0	3	56
27	270	30	0	2	2	20	0	3	66
28	280	31	1	2	3	5	1	0	8
29	290	32	2	2	3	15	1	0	18
30	300	33	3	3	0	0	1	0	28
31	310	34	4	3	0	10	1	0	38
32	320	35	5	3	0	20	1	0	48
33	330	36	6	3	1	5	1	0	58
34	340	37	7	3	1	15	1	1	0
35	350	38	8	3	2	0	1	1	10
36	360	40	0	3	2	10	1	1	20
37	370	41	1	3	2	20	1	1	30
38	380	42	2	3	3	5	1	1	40
39	390	43	3	3	3	15	1	1	50
40	400	44	4	4	0	0	1	1	60
41	410	45	5	4	0	10	1	2	2
42	420	46	6	4	0	20	1	2	12
43	430	47	7	4	1	5	1	2	22
44	440	48	8	4	1	15	1	2	34
45	450	50	0	4	2	0	1	2	42
46	460	51	1	4	2	10	1	2	52
47	470	52	2	4	2	20	1	2	62
48	480	53	3	4	3	5	1	3	4
49	490	54	4	4	3	15	1	3	14
50	500	55	5	5	0	0	1	3	24

10 Foot Long, or Broad.

	Feet	Yards.		Squares.			Rods.		
	Feet	Y.	F.	S.	Q.	F.	R.	Q.	F.
51	510	56	6	5	0	10	1	3	34
52	520	57	7	5	0	20	1	3	44
53	530	58	8	5	1	5	1	3	54
54	540	60	0	5	1	15	1	3	64
55	550	61	1	5	2	0	2	0	6
56	560	62	2	5	2	10	2	0	16
57	570	63	3	5	2	20	2	0	26
58	580	64	4	5	3	5	2	0	36
59	590	65	5	5	3	15	2	0	46
60	600	66	6	6	0	0	2	0	56
61	610	67	7	6	0	10	2	0	66
62	620	68	8	6	0	20	2	1	8
63	630	70	0	6	1	5	2	1	18
64	640	71	1	6	1	15	2	1	28
65	650	72	2	6	2	0	2	1	38
66	660	73	3	6	2	10	2	1	48
67	670	74	4	6	2	20	2	1	58
68	680	75	5	6	3	5	2	2	0
69	690	76	6	6	3	15	2	2	10
70	700	77	7	7	0	0	2	2	20
71	710	78	8	7	0	10	2	2	30
72	720	80	0	7	0	20	2	2	40
73	730	81	1	7	1	5	2	2	50
74	740	82	2	7	1	15	2	2	60
75	750	83	3	7	2	0	2	3	2
76	760	84	4	7	2	10	2	3	12
77	770	85	5	7	2	20	2	3	22
78	780	86	6	7	3	5	2	3	32
79	790	87	7	7	3	15	2	3	42
80	800	88	8	8	0	0	2	3	52
81	810	90	0	8	0	10	2	3	62
82	820	91	1	8	0	20	3	0	4
83	830	92	2	8	1	5	3	0	14
84	840	93	3	8	1	15	3	0	24
85	850	94	4	8	2	0	3	0	34
86	860	95	5	8	2	10	3	0	44
87	870	96	6	8	2	20	3	0	54
88	880	97	7	8	3	5	3	0	64
89	890	98	8	8	3	15	3	1	6
90	900	100	0	9	0	0	3	1	16
91	910	101	1	9	0	10	3	1	26
92	920	102	2	9	0	20	3	1	36
93	930	103	3	9	1	5	3	1	46
94	940	104	4	9	1	15	3	1	56
95	950	105	5	9	2	0	3	1	66
96	960	106	6	9	2	10	3	2	8
97	970	107	7	9	2	20	3	2	18
98	980	108	8	9	3	5	3	2	28
99	990	110	0	9	3	15	3	2	38
100	1000	111	1	10	0	0	3	2	48

The Explanation and Use of the TABLE.

IT consisteth of ten *Pages*: At the head of each *Page* is [1 *Foot broad.*] [2 *Foot broad*] 3 [*Foot broad*, &c.] to [10 *Foot broad.*]

Then, on the *Side* of each *Page*, in the first *Row*, or *Column* thereof, (that next the *left hand*) is set down the number of *Feet* that any thing measured is in *Length*, beginning at *One Foot*, 2 *Foot*, 3 *Foot*, &c. to 50 *Foot Long*: And in another *Row* (or *Column*) in the *Middle* of the *Page* the same number of *Feet Long* is continued from 50, 51, 52, 53, *&c.* to 100 *Foot Long*.

Then in the other *Columns* are contained.

1.	How many	Square Feet	Any thing measured doth contain.
2.		Square Yards and Feet	
3.		Square Squares, Quarters, and odd Feet	
4.		Square Rods, Quarters, and odd Feet	

As for Example

I. A *Walk* or *Causway*, Paved with *Free Stone*, is 7 Foot *Broad*, and 39 Foot *Long*, How many *Square Feet* is contained in that *Walk*?

Look for 7 Foot at the Head of the Table; and for 39 Foot in the first *Column*; then, under 7 Foot, and against 39 Foot, you shall find this Number 273, And so many Square Feet is contained in that *Walk* or *Pavement*.

II. There is a *Room Wainscoted* which is 8 Foot *High*, and the *Girt* about the same *Room* is 71 Foot; How many *Yards* of *Wainscot* doth that *Room* contain?

Look for 8 Foot at the Head of the Table; and for 71 *Foot* in the *Column* in the middle of the *Page*, and against 71 and under 8 Foot, you shall find 63 *Yards* 00 *Quarters*, and 1 *Foot*: And so much doth the Room contain.

III. There is a Room or *Gallery* Floor'd with *Boards* which is 97 Foot *Long*, and 9 Foot *Broad*; How many *Square* of *Flooring* is there in that Room?

Look for 9 Foot in the *Head* of the *Table*, and for 97 Foot in the *Column* in the middle of the *Page*; and right against 97, and under 9 *Foot* you will find these Numbers, 8. 2. 23 which is 8 *Square*, 2 *Quarters* (or half) and 23 *Foot*; which is 8 *Square* and *three Quarters*, wanting 2 Foot) and so much *Flooring* is in that Room or *Gallery*.

IV. There is a *Brick-wall* which is 45 Foot *Long*, and 9 Foot *High*; How many *Rods* of *Brick-work* is contained therein?

Look for 9 Foot at the *Head* of the *Table*, and under it against 45 Foot in the first *Column*, you shall find these Numbers, 1. 1. 67, that is, one Rod, one Quarter, and 67 Foot; (which is one Rod and a half, wanting but one Foot) and so much *Brickwork* is contained in that *Wall*; which if it be a *Brick and a half thick*, it needs no Reducement; but if it be either thicker or thinner, then it must be reduced to that thickness by the Rules before given.

These are the general Uses of this Table: But

Note I. If either the *Length* or the *Breadth* of the thing measured, be greater than the Numbers at the *Head* or *Side* of the *Table*; then take the half of that Number which is greater, and work with that as before; and the Number so found doubled, will be the true *Content*: As 87 Foot long and 16 Foot broad, the half of 16 is 8, look for 8 at the Head of the Table, under which and against 87 you shall find 696, the double of which is 1392 Foot, and so much is the true *Content*.

Note II. But if both the Numbers be greater than those in the Table, as 168 Foot long, and 18 Foot broad, then take the half of both the Numbers, and work as before, and the Number so found will be one Quarter of the true *Content*: So, the half of 168 is 84, and the half of 18 is 9; Now, under 9, and against 84 you will find 756 Foot, which is one Quarter, and that taken 4 times makes 3024 Foot, for the whole *Content* in Feet.

Note III You are not obliged to take the just half of that Number which is greater than the Table; but for 18 you need not take 9, but 10 and 8. And for 13 take 7 and 6, or 8 and 5, *&c.*

FINIS.